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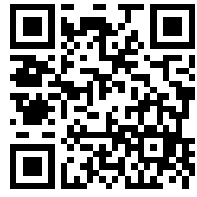

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THE

NAVAL ANNUAL,

1911.

EDITED BY

T. A. BRASSEY, A.I.N.A.,

Honorary Fellow of Balliol; Commander of the Order of the Crown of Italy.

PART I.—Lord Brassey, G.C.B.; Admiral Sir Cyprian Bridge, G.C.B.; Commander C. N. Robinson, R.N.; H. P. Hussey; John Leyland; Alexander Richardson; J. R. Thursfield; and the Editor.

PART II.—List of Ships: Commander C. N. Robinson, R.N., and John Leyland.

Plans of Ships: S. W. Barnaby, M.I.N.A.

PART III.—Armour and Ordnance: Commander C. N. Robinson, R.N.

PART IV.—First Lord's Memorandum; British and Foreign Estimates; The Declaration of London.

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PREFACE.

YEAR by year, as naval progress is reviewed in these pages, the predominant position once occupied by the British Navy becomes less marked. The German Navy is more nearly equal in power to the British Navy to-day than was the French Navy 15 years ago, when the Comparative Tables were first instituted in the *Naval Annual*; and it is evident, from the facts and figures set forth in this volume, that the present superiority of the British over the German Navy will in the immediate future diminish. The Navy of Austria, Germany's close ally, is becoming a factor in the naval situation; and Austria's recent action in the Balkan Peninsula, with the support of Germany, and in defiance of the Treaty of Berlin, is an indication of how the peace of the world may be disturbed. The rise of the United States to a first-class naval Power on the whole tends in the direction of peace. The relations between the two great branches of the English-speaking people have much improved in recent years, and the proposed arbitration treaty is an indication that they may become even closer in the not far distant future. The French Navy, after a long period of inanition, appears likely to again become a factor of importance. Our relations with France are happily most friendly, and there are no reasons why they should not so continue. The Italian, Russian, and Japanese Navies are barely holding their own amongst the Navies of the world, though all have powerful ships under construction. The construction of ships of the most powerful type by the South American Republics is worthy of note, as they may be sold to other Powers on hostilities becoming imminent. It is evident, from recent events at Rio Janeiro, that they are sometimes dangerous possessions for their owners.

The increase of the Navy Estimates for 1911–12 to over £44,000,000 shows the burden that is thrown on the tax-payers of the Mother Country in the endeavour to maintain that supremacy at sea which is vital to our existence. It has frequently been pointed out in these pages that the resources of the United Kingdom alone would ere long become unequal to the burden, and it is satisfactory that the Oversea Dominions—notably Australia and New Zealand—are showing an increasing disposition to materially assist in the naval defence of the Empire. South Africa is doing something; she cannot at the present stage do much more. The attitude of Canada towards Imperial defence is not yet clearly defined. With an enormous surplus she is in a position to do more than Australia and New Zealand. The French population in the East, and the large

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influx of settlers from the United States into the West, make the position of the Canadian Government on this question a difficult one. It is a great step forward that Canada intends to build a Canadian Navy, which, when the time of trial comes, will surely play its part in the defence of Imperial interests, by whomsoever they may be threatened. The acquisition of the Niobe is a good beginning. Some of her sister-ships would be useful at the Cape or in Australia.

The present volume of the *Naval Annual* contains the usual reviews of the Progress of Navies and of Comparative Strength. Mr. Leyland is responsible for the review of the Progress of Foreign Navies. Owing to an accident, which involved injury to the eyesight, the Editor could not collaborate as usual in this chapter, while the groundwork of Chapters I. and III., and the troublesome work of collating the information given in different parts of the volume, has been done by others. Two chapters are devoted to the Declaration of London, of which the text is printed in Part IV. That by Admiral Sir Cyprian Bridge deals with the subject from the point of view of the Navy; that by Mr. Leyland, which was prepared under great pressure, owing to the illness of the gentleman who had undertaken it, summarises the considerations for and against ratification. Lord Brassey contributes a chapter on Mercantile Auxiliaries—a question which will require consideration if the Declaration is ratified. The balance of opinion appears to be in favour of the Declaration being signed by this country. The strongest argument to the contrary is that its provisions will almost certainly be adhered to by us under all circumstances, whereas in the case of other Powers they may be as little regarded as was the Treaty of Berlin in the instance above referred to. A strong navy is, after all, the only guarantee that its provisions will not be violated to our detriment.

Mr. Richardson contributes, as usual, the chapter which is of especial interest to the naval engineer. Mr. Leyland deals with German Naval Administration. An old contributor, Mr. Thursfield, replies to some observations of Mr. Corbett on the Tactics of Trafalgar; while Captain Robinson, in addition to Part III., contributes an interesting paper on the evolution of the battleships since the appearance of the Dreadnought.

Though accurate information is still difficult to obtain in certain cases, and especially in that of Germany, many of the particulars indicated as doubtful the Editor believes to be substantially accurate. *Engineering*, and other papers giving Service news, have been largely drawn upon for reports of trials. No one is more conscious than the Editor that in such a mass of statistics as are given in the *Naval Annual* there must be errors.

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PART I.

CHAPTER I.

British Navy.

Since the last issue of the *Naval Annual* only two capital ships have completed their trials and been commissioned, namely, H.M.S. Neptune and Indefatigable, both of the 1908–1909 programme. Programme 1908-9.

The Neptune (as stated in last year's *Naval Annual*) is a battleship of an improved St. Vincent type, and is the only ship of her exact class. She was laid down at Portsmouth on January 19, 1909, launched on September 30 of the same year, and she completed her trials in November, 1910. Her machinery (turbines of Parsons' type and Yarrow boilers) was manufactured by Messrs. John Brown & Co., by arrangement with Messrs. Harland and Wolff, the contractors. Displacement, 19,900 tons; length (between perpendiculars), 510 ft.; beam, 85 ft.; draught, 27 ft.; S.H.P., 25,000; contract speed, 21 knots. The Neptune carries an armament of ten 12-in. guns of 50-calibres and sixteen 4-in. guns, and has three 21-in. torpedo tubes. The 12-in. guns are mounted in pairs in five turrets, but arranged differently from those of her predecessors. The two side turrets are placed *en échelon* amidships, which enables the guns to be trained through almost a complete circle, and to fire on either beam. The middle turret on the centre line is placed immediately forward and is higher than the after turret. All the ten 12-in. guns can thus be fired on either beam, while eight are available for stern fire and six for bow fire. This arrangement of guns, which has been adopted in the Colossus and Hercules also, though having advantages for bow and stern fire, on the other hand limits the arc of training of the écheloned guns. Consequently, in the Orion and other later vessels the guns (13·5-in. in their case) will be arranged in pairs in turrets on the centre line, so that the whole of the ten guns will be able to fire on either broadside, four guns ahead and four guns astern; while for firing slightly at an angle six guns can be made to bear very nearly straight ahead, and six very nearly astern. Neptune.

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The following particulars of the steam trials of the Neptune are taken from *Engineering*:—

Name.	First 30 Hours, at ½ power.		Second 30 Hours, at ⅞ power.		Eight Hours, full power.		
	I.H.P.	Coal.	I.H.P.	Coal.	I.H.P.	Coal.	Speed.
Neptune . .	{3,662* 5,069†}	—	18,373	1 74	27,721	1·46	21·786

* With auxiliaries exhausting into condenser.
† „ „ turbines (closed exhaust).

On the gun trials it is reported that, owing to improved fire control, etc., a very much improved rate of fire has been maintained.

Indefatigable.

The cruiser-battleship Indefatigable, like the Invincible, Indomitable and Inflexible, carries an armament of eight 12-in. guns and sixteen 4-in. guns, and is fitted with two torpedo tubes, and has a contract speed of 25 knots. Her 12-in. and 4-in. guns are of 50 calibres, and her torpedo tubes 21-in., as compared with the Invincible's 12-in. guns of 45 calibres, 4-in. Q.F. guns and 18-in. torpedo tubes. She was laid down at Devonport on February 23, 1909, launched on October 28, and went on her trials in 1910. Her full-power trial on December 14 was carried out in stormy and unfavourable weather, but the mean speed was over 26 knots. She had, however, previously, at three-quarter power, reached 27 knots, and it is anticipated that she will attain 28 knots on full power. She was commissioned on February 24, before carrying out her final trials for acceptance. Her machinery, with turbines of Parsons' type, and Babcock & Wilcox boilers, was supplied by Messrs. John Brown & Co. Displacement, 18,750 tons; length, 555 ft.; beam, 80 ft.; draught, 26 ft. 6 in.; S.H.P., 43,000.

Programme 1909-10.

Passing to the ships of the 1909–10 programme now under construction, the following five battleships and one armoured cruiser have been launched:—The Colossus on April 9, 1910, by Messrs. Scott, at Greenock; the Hercules on May 10, 1910, by Messrs. Palmer, at Jarrow-on-Tyne; the Orion, at Portsmouth, on August 20, 1910; the Thunderer on February 1, 1911, by the Thames Iron Works, at Blackwall; the Monarch on March 30, 1911, by Messrs. Armstrong, at Newcastle-on-Tyne; and the cruiser-battleship Lion on August 6, 1910, at Devonport. The only remaining battleship of the Orion class, the Conqueror, building by Messrs. Beardmore, at Dalmuir, and the cruiser-battleship Princess Royal, building by Messrs. Vickers, at Barrow, are progressing well, and will be launched probably before these pages are published.

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The Colossus and Hercules went through their trials in March, 1911, with the following results,* the figures in the table representing the mean of six runs on the measured mile :— Colossus and Hercules.

—	30 Hours at $\frac{7}{10}$ Power.			8 Hours at Full Power.		
	S.H.P.	Rev.	Speed.	S.H.P.	Rev.	Speed.
Hercules . .	17,000	296	19·6	28,700	335	21·5

The four battleships of the Orion class have a displacement of 22,500 tons, or nearly 5000 tons more than the Dreadnought; length, 545 ft.; beam, 88½ ft.; draught, 27½ ft. The armament comprises ten 13·5-in. guns and twenty-four 4-in. guns. The 13·5-in. guns, as already mentioned, are mounted in pairs in turrets on the centre line. Owing to improvement in mountings the rate of fire is about the same as that of the 12-in. gun. The 13·5-in. gun throws a projectile of 1250 lb., as compared with one of 850 lb. in the case of the 12-in. gun. The weight of a broadside from the Orion is therefore 12,500 lb., as compared with 8500 lb. for the Neptune and Colossus, and 6800 lb. for the Dreadnought, Bellerophon, and St. Vincent. Professor Welch attached to a paper, read at the spring meeting of the Institute of Naval Architects, tables showing the lbs. of broadside from the main armament per ton of displacement, from which the following figures are extracted :— Orion class.

		lbs.
French	Courbet	·33
British	Orion	·56
,,	Colossus	·42
,,	Dreadnought	·38
German	Helgoland	·43
,,	Nassau	·33
United States	Texas	·52
,,	Delaware	·43

British battleships of the Dreadnought era carry no secondary battery. German and United States battleships carry a considerable secondary battery of 6-in. or 5-in. guns mounted in protected positions on the main deck. The 4-in. anti-torpedo guns of British battleships are mounted in the most exposed positions, and could be of little value after an engagement. The Orion class are fitted with three 21-in. torpedo tubes.

As regards protection the Orion class have a waterline belt of 12-in. armour, as compared with 10 in. in the Neptune. The side above the belt is protected by 9-in. armour, and the turrets by 10-in.

* Exact figures for the Colossus are not available. On both trials she attained the same speed as the Hercules.

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armour. There are transverse bulkheads and two protective decks. The designed speed is 21 knots, with 27,000 S.H.P. The coal capacity at load draught is 1000 tons; the maximum coal capacity is 2700 tons in addition to oil fuel.

Lion.

The displacement (26,350 tons), horse-power (70,000), and speed (28 knots) of the Lion and Princess Royal were given last year. The armament comprises eight 13·5-in. guns and sixteen 4-in guns. The German cruiser-battleships built and building carry, besides their main armament, a powerful secondary battery of ten 6-in. guns. The protection is considerably increased as compared with the earlier British cruiser-battleships; the thickness of armour on the belt and turrets from 7 in. to 9 in.; and on the side above the belt from 3 in. to 6 in.

Programme 1910–11.

Orders for the five capital ships of the 1910–11 programme were given out in January, 1911, as follows:—Battleships, King George V. to Portsmouth, with machinery by the Parsons Co.; Centurion to Devonport, with machinery by Messrs. Hawthorn Leslie & Co.—both these were laid down on January 16, 1911; Ajax to Messrs. Scott, Greenock, laid down on February 27, 1911; Audacious to Messrs. Cammell Laird & Co., Birkenhead; cruiser-battleship Queen Mary to Messrs. Palmer and Co., Jarrow-on-Tyne. For each of the three last the builders will construct the machinery. The four battleships will, it is stated, have a displacement of 23,000 tons; length, 555 ft.; beam, 89 ft.; draught, 27½ ft.; S.H.P., 31,000; as against the 22,500 tons, length 545 ft., beam 88½ ft., draught 27½ feet, and S.H.P. 27,000 of the Orion. They will carry the same armament as the Orion class, namely, ten 13·5-in. 45-cal. and twenty-four 4-in. 50-cal. guns, and three 21-in. torpedo tubes. The Queen Mary has approximately the same dimensions as the Lion and Princess Royal. The following particulars must be accepted with reserve. Displacement, 27,000 tons; length, 660 ft. between perpendiculars; beam, 87 ft.; draught, 28 ft.; S.H.P., 75,000; speed, 28 knots. The armament will comprise eight 13·5-in. guns, as in the Lion, and the protection is also similar.

Protected cruisers, Bristol class.

Passing to the second-class protected cruisers, all the five of the Bristol class which were laid down early in 1909 have completed their trials, having in each case largely exceeded the contract speed. The displacement of these ships is 4800 tons; length, 430 ft.; beam, 47 ft.; draught, 15 ft. 3 in.; I.H.P., 22,000; contract speed, 25 knots. They carry an armament of two 6-in. guns, and ten 4-in. guns, one 12-pdr., and four machine guns, and are fitted with two torpedo tubes. As pointed out in last year's *Naval Annual*, these ships carry a very poor armament for their size. The Bristol is fitted with Brown-Curtis turbines and the remaining four ships with turbines of the Parsons

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type. They are all supplied with Yarrow water-tube boilers, and each has been engined by her builders, except the Newcastle, which was engined by the Wallsend Slipway Co. The following are particulars of the full-power trials:—

Name.	Builders.	S.H.P.	Coal.*	Speed.
Bristol	John Brown & Co.	24,227	1·66	26·84
Glasgow	Fairfield Co.	22,472	1·61	25·8
Gloucester	Beardmore's	23,757	1·68	26·29
Liverpool	Vickers, Maxim	24,614	1·65	26·17
Newcastle	Armstrong's	24,669	1·52	26·26

* Coal equivalent of total fuel—oil and coal.

The trials of these five ships were interesting as affording some comparison between the Brown-Curtis and Parsons turbines. The coal consumption of the Bristol with Curtis turbines was at all powers consistently higher than the other four ships with Parsons turbines, the figures in the full-power trial being 1·66 lb. for the Bristol as against an average of 1·61 lb. for the other four ships. On the other hand the Bristol had a better propulsive efficiency, obtaining a slightly higher speed per S.H.P. At full power, with 24,227 S.H.P., she achieved 26·84 knots, against 24,240 S.H.P. and 26·13 knots, the average of the four Parsons turbined ships.

Improved Bristols.

The four ships of the improved Bristol class of the 1909–1910 programme—the Dartmouth (building by Vickers, Maxim), the Falmouth (Beardmore's), the Weymouth (Armstrong's), and the Yarmouth (London and Glasgow Co.)—have a contract speed of 24¾ knots, as against the 25 knots of the Bristol, but they carry eight 6-in. guns as against two 6-in. and ten 4-in., and their displacement is larger, being 5250 tons, as against 4800 tons in the earlier ships. This enlargement is provided for by increasing the beam from 47 ft. to 48 ft. 6 in., and the draught from 15 ft. 3 in. to 15 ft. 6 in. The Yarmouth will have Curtis, the other three Parsons turbines. The Falmouth was launched on September 20, the Weymouth on November 18, 1910, and the Dartmouth on February 14, 1911.

Under the 1910–1911 programme three more vessels of the Bristol class were laid down early in 1911; the Chatham, on January 3, at Chatham Dockyard; the Southampton, by Messrs. John Brown & Co.; and the Dublin, by Messrs. Beardmore. The Thames Ironworks are to supply the machinery for the Chatham, while that for each of the other two will be supplied by the builders. These ships will, it is stated, be very similar to the four of the

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Dartmouth type, but slightly larger, having a displacement of 5400 tons; length, 430 ft.; beam, 49½ ft.; draught, 15 ft. 9 in.; S.H.P., 25,000; speed, 25·5 knots. The armament comprises eight 6-in. guns, four 3-pdrs., four maxims, and one field gun.

Third-class cruisers.

Of the unarmoured cruisers of the Boadicea class, which have followed one another at Pembroke, the Blanche completed her trials in 1910, and has been commissioned. On her trials, with 18,542 S.H.P. and coal consumption of 1·56 lb., she obtained a speed of 25·67 knots, her contract speed being 25 knots. The Blonde, laid down in December, 1909, was launched on June 22, 1910. The following are the results of her trials:—

—	I.H.P.	Coal.	Speed.
22 hours	11,454	1·75	23·3
8 ,, ...	15,360	1·63	24·5
8 ,, ...	18,770	1·02	25·43

The Blonde was at once succeeded on the stocks by the Active, on whose launch, on March 14, 1911, the Amphion was laid down. The later vessels of this class carry a larger armament than the earlier ones, and have a rather larger displacement. The Boadicea, the first of the class, carried six 4-in. guns, and her displacement was 3300 tons. Her successor, the Bellona, had a displacement increased to 3360 tons, with 41 ft. 6 in. beam, as against 41 ft., being in other respects similar to the Boadicea and carrying the same armament, while the Blanche and the Blonde carry ten instead of six 4-in. guns. The building of these third-class cruisers is very doubtful policy. They cost about £300,000, and as fighting ships are of little value. For an addition of 10 or 12 per cent. to the cost a Dartmouth can be produced, which is of some value for the protection of commerce, and is more powerful than the German third-class cruisers.

Destroyers.

During the year beginning April 1st, 1910, there have been completed and commissioned 28 destroyers, comprising the Viking (33 knots), of the 1907–1908 programme, 15 boats (27 knots) of the 1908–1909 programme, namely, the Beagle, Bulldog, Foxhound, Renard, Wolverine, Racoon, Grasshopper, Mosquito, Scorpion, Harpy, Basilisk, Savage, Pincher, Rattlesnake, Scourge, and 12 out of the 20 of the Acorn class (27 knots) laid down 1909–1910, viz., the Acorn, Alarm, Larne, Lyra, Martin, Redpole, Rifleman, Cameleon, Comet, Goldfinch, Hope, Nemesis. Three more, the Ruby, Minstrel and Staunch, will very shortly be added to the list. The Nautilus was badly damaged by collision when on trial, whence the delay

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in her delivery. The following particulars of the destroyers' trials are taken for the most part from *Engineering*:—

Name of Vessel.	Type of Vessel.	Builders of Vessel and Makers of Machinery.	Speed on Full-power Trial.
			knots
Viking	Torpedo-boat destroyer	Palmer's Company	33·4
Beagle	,,	John Brown & Co.	27·12
Scourge	,,	Hawthorn Leslie & Co.	27·06
Bulldog	,,	John Brown & Co.	27·4
Foxhound	,,	John Brown & Co.	27·7
Grasshopper	,,	Fairfield Company	27·04
Harpy	,,	J. S. White & Co.	27·75
Rattlesnake	,,	London & Glasgow Company	27·03
Savage	,,	Thornycroft & Co.	27·16
Mosquito	,,	Fairfield Company	27·12
Wolverine	,,	Cammell Laird & Co.	27·1
Pincher	,,	Denny Brothers.	27·17
Renard	,,	Cammell Laird & Co.	27·14
Basilisk	,,	J. S. White & Co.	27·98
Scorpion	,,	Fairfield & Co.	27·1
Racoon	,,	Cammell Laird & Co.	27·07
Cameleon	,,	Fairfield Company	28·03
Acorn	,,	John Brown & Co.	27·22
Larne	,,	Thornycroft & Co.	27·99
Redpole	,,	J. S. White & Co.	29·14
Comet	,,	Fairfield Company	27·9
Lyra	,,	Thornycroft & Co.	28·71
Hope	,,	Swan, Hunter & Wigham Richardson; Wallsend Slipway Engineering Co.	—
Ruby	,,	J. S. White & Co.	—

Orders for the 20 destroyers of the 1910–1911 programme were placed as follows:—

Messrs.	Thornycroft & Co.	Southampton	Acheron, Ariel.
,,	Yarrow & Co.	Scotstoun	Archer, Attack.
,,	Denny Bros.	Dumbarton	Badger, Beaver.*
,,	,,	,,	Defender, Druid.
,,	J. S. White & Co.	Cowes	Ferret, Forester.
,,	W. Beardmore & Co.	Dalmuir	Goshawk.
,,	J. Brown & Co.	Clydebank	Hind, Hornet, Hydra.
,,	Hawthorn Leslie & Co.	Newcastle	Jackal, Tigress.
,,	Cammell Laird & Co.	Birkenhead	Lapwing, Lizard.
,,	Vickers, Sons & Maxim	Barrow	Phœnix.
,,	Swan, Hunter & Co.	Newcastle	Sandfly.

* Designed by Messrs. Parsons.

The vessels were all laid down between September, 1910, and February, 1911. Of these it is stated that 14 will be of the Acorn class, of 780 tons displacement, 240 ft. length, 25 ft. 6 in. beam, and a speed of 27 knots, carrying two 4-in. B.L. guns and two 12-pdrs All 14 will be fitted with Parsons turbines except the three building by Messrs. J. Brown & Co., which will have Curtis turbines. In the case of the remaining six, viz., those building by the Parsons Co., Messrs. Thornycroft and Messrs. Yarrow, there will be greater latitude

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in the design of ship and machinery, though the speed and the armament are to be the same. Orders for three additional destroyers, to be completed in 1912–1913, have recently been placed with Messrs. Yarrow.

Sub-marines.

Three submarines were completed during 1910–11, namely, C 33 and 34 at Chatham and D 2 at Barrow. Of the boats laid down under the 1909–10 programme there remain six under construction, D 3–6 at Barrow, which are well advanced, and D 7 and 8 at Chatham, which are almost completed. Of the six boats of the 1910–11 programme, two are building at Chatham and four at Messrs. Vickers'. These boats, which are to be known as the E class, will, it is stated, represent a considerable advance on the previous boats, having a displacement when submerged of 800 tons, 176 ft. length and nearly 23 ft. maximum breadth, and a surface speed of 15 knots. They are also to have a more powerful armament, and will be superior to their predecessors in many details.

Naval airship.

Mention must be made of the airship under construction by Messrs. Vickers at Barrow for the British Navy. It will be remembered that the Advisory Committee appointed in April, 1909, recommended that the Army should undertake the design and construction of a small type of non-rigid dirigible airship, and that the Navy should devote itself to evolving a rigid airship of large capacity and great radius of action. The construction of the latter was entrusted to Messrs. Vickers, and the airship was completed early in 1911, and will soon be undergoing trials. The framework of the balloon is 512 ft. in length and 48 ft. in breadth, and is built of duralumin—one of the magnesium alloys of aluminium—which has a specific gravity of between 2·77 and 2·84 and strength and hardness equal to that of mild steel. The balloon carries two ship-shape "gondolas," which are capable of floating the structure should the airship alight in the water, each "gondola" containing a typical ten-cylinder Wolseley marine petrol motor. The ship is enabled to rise or fall by means of three parallel horizontal planes on each side, pivoted in the centre and connected with a vertical rod at each corner. For lateral direction there are three groups of vertical planes—one of four parallel planes above, a similar group below, the main structure near the stern, and a group of three planes abaft the propeller in the after "gondola."

Naval manœuvres.

The Naval Manœuvres were held last year in July, on the west coast of Great Britain, Admiral Sir W. May, in H.M.S. Dreadnought, and Admiral Sir E. Poe, in H.M.S. Exmouth, having command. As in 1909 the first two divisions of the Home Fleet, the Atlantic Fleet and the Mediterranean Fleet, as well as the Third and Fourth

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Divisions of the Home Fleet, which were mobilised for the purpose, all took part in the manœuvres. A little over 18,000 men were required to complete nucleus and skeleton crews to full commission. The following table shows the strength of the various fleets engaged, the figures being approximate :—

—	Battle-ships.	Armoured Cruisers.	Protected Cruisers.	Scouts.	Destroyers.
Ships permanently with full complement :—					
Home Fleet—1st Division .	9	4	3	2	25
,, ,, 2nd ,, .	8	5	3	2	25
Atlantic Fleet	6	4	2	..	..
Mediterranean Fleet . .	6	3	1	..	..
	29	16	9	4	50
Ships with nucleus crews increased to full complement :—					
Home Fleet—3rd Division .	11	8	12	4	69
Ships with skeleton crews increased to full complement :—					
Home Fleet—4th Division .	4	..	11	..	..
	44	24	32	8	119

Besides the above there were many torpedo-boats, 6 torpedo-gun-boats, 5 mine-laying vessels, 18 depôt and repairing ships, and 60 submarines, making in all a total of 400 ships approximately taking part in the manœuvres.

Fleet exercises.

Towards the end of January, the greater part of the Home, Atlantic and Mediterranean Fleets were engaged in combined fleet exercises off the west coast of Spain. The following vessels took part :—

	Battleships.	Armoured Cruisers.	Protected Cruisers.
Home Fleet, 1st Division	7	4	2
,, 2nd ,, ...	5	4	2
Atlantic Fleet	6	3	1
Mediterranean Fleet	4	3	—
	22	14	5

No destroyers were engaged in these manœuvres.

The practice of sending the Home Fleet or a portion of it abroad during the winter months might well be extended. The efficiency of the Fleet can hardly have been improved by the reduction of the

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length of commission from three to two years. To keep most of our effective ships tied to Home ports for most of the year, the crews constantly broken up by leave, can still less conduce to efficiency.

Naval gunnery.

In Part IV. will be found particulars of Tests of Gunlayers with heavy guns in 1910. An official note accompanying the return expresses satisfaction that the standard of shooting which was attained in 1909 has been maintained, and this is justified by the figures. The results for 1910 are not directly comparable with those for previous years, as the time allowed for the run with each type of gun has been reduced, and further, in the 1910 returns a ricochet is counted as a half-hit only, whereas in previous years it was counted as a hit. After making allowance for this, the percentage of hits to rounds fired was, in 1910, 54·86, as against 54·12 in 1909 and 53·57 in 1908, while, without making such allowances, the number of hits per gun per minute was greater with the 12-in., 10-in., 9·2-in., 7·5-in., but less with the 6-in., 4·7-in. and 4-in. guns than in 1909. It is to be observed that the total number of shots fired in 1910—7209—was less by over 2000 than the average number fired in the three preceding years. The Natal again easily heads the list of individual ships, with the Temeraire second, these two standing out considerably above others. The results of gunlayers' tests for torpedo-boat destroyers in 1910 were as follows:—

Nature of Gun.	Rounds fired.	Hits.		Misses.	Percentage of hits to rounds fired.*
		Direct.	Ricochet.		
4-in. B.L.	140	62	5	73	46·07
12-pdr. 12 cwt. on P.V. and V.I. mountings	135	57	9	69	45·56
12-pdr. 12 cwt. on P.I. mountings	1052	386	51	615	39·12
12-pdr. 8 cwt.	461	125	17	319	29·96
6-pdr., with telescopes	1921	878	82	961	47·84
6-pdr., without telescopes	138	37	7	94	29·35

* Ricochet hits counting half a hit. Not directly comparable with previous years.

The hits per gun per minute with the 4-in. B.L. gun averaged 3·63, with the 12-pdr. 12 cwt. gun 3·88, with the 12-pdr. 8 cwt. gun 2·73, and with the 6-pdr. 6·43.

The Dominions and the Navy.

With regard to the contributions of the Dominions, whether in ships or money, towards the naval resources of the Empire, considerable advance is being made.

New Zealand.

The cruiser-battleship of the Indefatigable class which New Zealand is contributing to the Imperial Navy was laid down at Govan by the Fairfield Company on June 20, 1910, and it is pro-

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posed to launch her on June 29th, 1911, and to have her, like the Australia, ready for commission in September, 1912.

New Zealand also continues her annual contribution of £100,000, which will presumably be applied towards the general maintenance of the Navy. On the other hand, the Commonwealth Government has undertaken the whole cost of maintaining the Australian units.

Australia.

It will be remembered that at the Imperial Conference of 1909 it was proposed that an Australian Naval unit should be formed, consisting of one cruiser-battleship, three second-class cruisers, six torpedo-boat destroyers, and three submarines. Of these the cost of construction was originally estimated at £3,695,000, but this will be exceeded owing to improvements in type. The cost of annual maintenance was estimated at £750,000, of which it was agreed that the Imperial Government should bear £250,000 until such time as Australia could undertake the whole cost. The Commonwealth Government has now decided to bear the entire expense of maintenance without any assistance from the Home Government.

In March, 1911, Admiral Sir Reginald Henderson, who was appointed to advise the Commonwealth on naval defence, presented his report. After recognising that the primary object of the Australian Navy is to strengthen the Empire's command of the sea, and the secondary object to protect Australian ports and shipping from hostile raids, the report recommends the creation within 22 years of a fleet of eight armoured and ten protected cruisers, 18 destroyers, and 12 submarines, including units now under construction. The total cost is estimated at £23,000,000, the annual cost of maintenance at £1,226,000, and the ultimate *personnel* at 15,000 men. The report further recommends the building up of the resources and plant necessary for the manufacture of all the material within the Commonwealth, either by the establishment of Government dockyards and arsenals, or by the encouragement of private enterprise.

Returning to the shipbuilding programme already adopted, the cruiser-battleship Australia, which will be a sister-ship of the Indefatigable, was laid down at Messrs. John Brown's at Clydebank on June 23rd, 1910, will possibly be launched in October, 1911, and is due for commissioning in September, 1912. Of the three projected cruisers of the Town class, two are under construction: the Sydney, by the London and Glasgow Co., and the Melbourne, laid down by Messrs. Cammell Laird & Co. It is proposed to build the third ship, the Brisbane, in Australia, possibly at Cockatoo Island, the Government dockyard in Sydney Harbour.

Of the six projected destroyers, three, it will be remembered, were laid down in 1909, the Parramatta and Warrego by the Fairfield

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Co. at Govan, and the Yarra, by Messrs. Denny at Dumbarton; of these the Parramatta and Yarra were completed in Scotland, and have been the first units of the new Australian Navy to arrive in Australian waters, having reached the naval depôt at Williamstown, Victoria, in December, 1910; the Warrego has been shipped in pieces, and is being erected at Cockatoo Island. These three are sister-ships, with a displacement of 700 tons, and dimensions nearly the same as the Acorn class, which have 780 tons displacement. They have a contract speed of 26 knots, and carry one 4-in. and three 12-pdr. guns, and three 18-in. torpedo tubes as against the 27 knots, two 4-in., two 12-pdrs., and one torpedo tube of the Acorn class. They are designed to have a radius of action of 2500 nautical miles, at a speed of 14 knots; but on her trials the Parramatta largely exceeded her contract speed (she obtained on her last two runs 28·48 knots), with a consumption of oil fuel which would give her a radius of 1000 nautical miles at full speed, and a radius of well over 3000 nautical miles at a speed of 14 knots. It is intended to build the remaining three destroyers in Australia.

Of the three proposed submarines, two are now under construction by Messrs. Vickers at Barrow.

South Africa. The Union of South Africa is continuing the annual contributions formerly made to the Imperial Navy of £50,000 by Cape Colony and £35,000 by Natal.

Canada. Turning to Canada, the Rainbow and Niobe, which have been purchased by the Canadian Government for use as training ships, have both been refitted, and transferred, the former to Esquimalt, which she reached on November 7th, and the latter to Halifax, where she arrived on October 21st, 1910. The Niobe is a first-class protected cruiser launched at Barrow in 1897. Displacement, 11,000 tons; speed, 20 knots; armament sixteen 6-in. The Rainbow is a second-class cruiser launched at Jarrow in 1891. Displacement, 3600 tons; speed, 19 knots; armament, two 6 in. and six 4·7 in. guns.

The dockyards both at Halifax and Esquimalt are now under the control of the Canadian Government, the latter having been formally transferred on Nov. 9th, 1910.

In May, 1910, the Naval Act was finally passed authorising the first step in the creation of a Canadian Navy. The programme comprised four ships of the Bristol type, one of the Boadicea type, and six destroyers. The Niobe, however, will be considered a substitute for the vessel of the Boadicea type. Early in February, 1911, tenders were invited from British and Canadian builders for the remaining ten vessels, it being stipulated that all are to be built in Canada. Tenders were to be handed in by May 1, 1911.

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Newfoundland continues her annual contribution of £3000.

Estimates 1911–12.

The Navy Estimates for 1912 amount to £44,392,500 as compared with £40,603,700 in 1910–11, an increase of £3,788,800. Previous to last year the high-water mark of expenditure on naval services from Navy Votes and loans was reached in 1904–5, when the total amounted to £39,628,018, including £3,402,375 spent under Naval Works Acts. In the last three years all current expenditure on Naval Works has been met out of Navy Votes, the Naval Works Vote being charged with an annuity of about £1,325,000 in repayment of loans contracted under the Naval Works Acts. This point must be borne in mind when comparing the Naval Expenditure of the present and last two years with that of the years preceding 1909–10. The present system of meeting all naval expenditure, whether on ships or works, out of the votes of the year is far sounder than that of contracting Naval loans, which tend to extravagance.

The principal heads of increase in 1911–12, as compared with 1910–11, are as follows:—Vote 1, wages, £122,100; Vote 2, victualling and clothing, £118,500; Vote 8, shipbuilding, repairs, maintenance, etc., £2,408,600; Vote 9, naval armaments, £940,000. As regards Vote 8, it should be noted that, as the additional sum provided for new construction in 1911–12, as compared with 1910–11, is £1,784,047, while the difference in the total vote is as given above, the additional expenditure on repairs and maintenance in 1911–12 is £614,000.

The contributions from India and the Colonies towards Naval Expenditure amount to a total of £607,400, of which India is responsible for £212,000, Australia for £207,000, New Zealand for £100,000, South Africa for £85,000, and Newfoundland for £3,000.

Personnel.

The number of the *personnel*, which stood at 130,000 in 1904–5, and for the next five years ranged between 127,000 and 128,000, rose to 131,000 in 1910–11, and is to be further increased to 134,000 during the year 1911–12.

The numbers of the Fleet Reserve provided for are 24,700, an increase of 600. The actual numbers borne on January 1st, 1911, were, however, only 22,133. At the same date there were 8601 men in the Pensioner Reserve.

The numbers of the Royal Naval Reserve fall to 21,094, a decrease of 821. This figure includes 600 in Newfoundland, which is the same as last year, and 550 in Australasia, a decrease of 30. A new feature in 1911–12 is the Trawler Section, for which 639 men are voted. The numbers borne in the Royal Naval Reserve on January 1st, 1911, were 20,176, or over 900 under the establishment.

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The establishment of the Royal Naval Volunteers stands at 4400 men. The number of efficients borne on January 1st, 1911, was 4008.

New construction.

The sum provided for new construction is £15,063,877, as against £13,279,830 in 1910–11. For the five preceding years the expenditure on new construction did not exceed £10,000,000, and in 1907–8 and 1908–9 it was under £8,000,000. Over £13,300,000 of the amount provided for 1911–12 will be spent on ships already in hand, £1,738,645 being devoted to beginning work on the ships of the new programme.

Fleet Auxiliaries.

There has been a very considerable addition to naval expenditure in recent years for the maintenance and provision of Fleet Auxiliaries —mother-ships for destroyers, and submarines, mine-layers, mine-sweepers, etc. The expenditure on this head goes far to counterbalance the economy made a few years ago by the withdrawal of ships from foreign stations.

The following Fleet Auxiliaries are now under construction :— The Maidstone (depôt ship for submarine boats) by Messrs. Scott, at Greenock :—Length, 320 ft.; beam, 45 ft.; draught, 16 ft.; displacement, 3600 tons; I.H.P., 2800; and two tenders for submarine boats (the Adamant and Alecto), building by Messrs. Cammell Laird :—Length, 190 ft.; beam, 32 ft. 6 in.; draught, 11 ft.; displacement, 935 tons; I.H.P., 1400. These three vessels, which are to have a speed of 14 knots, were all laid down in January and February, 1911, and will be completed during 1911–1912. There is also a water tank and salvage vessel, building by Messrs. Vickers, for completion during 1911–1912 :—Length, 160 ft.; beam, 44 ft.

The two floating docks for Portsmouth and the Medway, under construction by Messrs. Cammell Laird and Messrs. Swan & Hunter respectively, will be completed during 1911–1912, and two more have been provisionally ordered of the latter Company.

Rosyth.

The contract date for completion of the new naval depôt at Rosyth is September, 1916, and the First Lord stated in the House of Commons on March 16th, 1911, that this date is likely to be anticipated by at least a year. It may be observed that while the total cost of the depôt and new magazines is estimated at £3,868,000, the expenditure to March 31st, 1911, is put at £356,500 only. In 1911–1912 it is proposed to spend £363,000 (as against £263,000 last year), leaving a balance of over £3,100,000. Of this, however, the First Lord has stated that nearly £1,000,000 will not become chargeable on the Estimates till after 1914 at the earliest.

H. P. Hussey.
T. A. Brassey.

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CHAPTER II.

Progress of Foreign Navies.

France.

The report of M. Paul Bénazet upon the French Navy Estimates of 1911 was a document which served to deepen the impression given by those of his predecessors, M. Bos and M. Chaumet. He adduced the striking fact that, while within fifteen years Germany expended £100,000,000 on her Fleet and France £152,000,000, the German Fleet rose to the second place among the world's navies, and that of France sank to the fourth. He attributed the failure, not to an individual, but to negligence, neglect, and routine. Next he gave a rapid survey of the "Bilan de la Marine" of M. Picard, the proposals of Admiral Boué de Lapeyrère and other documents and plans, of which an account was given in the *Naval Annual* last year.

Naval policy.

He argued that if France had built nine battleships of 14,000 tons instead of fifteen armoured and protected cruisers, which he named, she might now have had a force of 25 modern battleships, or of 31, if the Masséna, Bouvet, Carnot, Brennus, Charles Martel, and Jauréguiberry were included. If she had not built 20 submarines of the Naïade class, she might have dredged the port of Toulon and built a large dry dock there, and if she had not expended great sums in reconstructing old vessels, she would have had money for other essential purposes. It may, of course, be remarked that, if the nine battleships referred to had not been built, there might also have been more Dreadnoughts to-day. If the British Navy had not built the Royal Sovereigns and the German Navy the Kaisers, each might have had more of the bigger and more powerful ships. This argument loses sight of the fact that in naval construction there is always advance from class to class and type to type, experience and changed conditions justifying the advance, and that the most penetrating foresight in these matters leads to advances that are really decisive of relative merit and strength. M. Bénazet was on firmer ground when he demonstrated the fundamental error of trusting to a strategy based upon mere coast defence:

C'est ainsi que la façon antimilitaire dont nous avons cherché à résoudre le problème de la défense de notre frontière de mer nous a fait éparpiller notre argent. La crainte d'un débarquement ou d'un bombardement et la pensée que, pour en

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éviter les conséquences, il est suffisant de garnir nos côtes de petits engins peu coûteux à construire, nous ont amenés à concevoir un système de défense des côtes compliqué et d'une efficacité à peu prés nulle. Nous avons eu, en effet, la prétention de rendre inviolable notre frontière de mer sur ses 2,560 kilomètres et, pour accomplir ce tour de force, nous avons voulu nous reposer uniquement sur une chaîne de défenses fixes: un chapelet de petits torpilleurs, de garde-côtes et de canonnières cuirassées d'une part, des batteries de côtes et des mines sous-marines d'autre part.

The Budget Reporter did not allow his countrymen to think they could dispense with a real Navy if the colonial possessions were to be safeguarded. To renounce the defence, or by negligence to compromise it, would be to commit as grave a fault, he said, as that of Louis XIV. when he abandoned the policy of Colbert and listened to the advice of Pontchartrain to devote money to coast defence instead of to the sea-going fleet. The squadrons sacrificed by the Roi Soleil could not be created afresh under Louis XV., and, as Saint Simon wrote later, "Il faudrait à la France trente ans de paix et du plus sage gouvernement pour remonter sa marine au point où Colbert et Seignelay l'ont laissée."

The practical part of M. Bénazet's report was its firm support of the programme of Admiral Boué de Lapeyrère (of which a full account was given in the *Naval Annual* last year) as a minimum. That programme was a compromise between that of the Superior Council of the Navy and the financial stringency of the time. The admiral's programme, said M. Bénazet, was most restricted, and would scarcely give France sufficient force to create an equilibrium in the Mediterranean with the forces of Austria and Italy.

Battle-ships.

A Bill embodying the features of the programme has not yet been adopted. Last year a special Bill, voted on April 5th, authorised the building of two ships of the programme, the Jean Bart and Courbet, which were laid down respectively at Brest and Lorient on December 1st, and are expected to be ready for trials on May 1st, 1913, and to join the fleet before the close of that year. They are being built from the plans of M. Lyasse. Some description of these ships was given last year. The main armament comprises twelve 12-in. guns and twenty-two 5·5-in. guns. Of the 12-in. guns eight can be fired ahead or astern and ten on either beam. Of the 5·5-in. guns, eighteen are mounted in a central battery protected by 7-in. armour. The turbines of the Jean Bart are being constructed by the Forges et Chantiers de la Seyne. The same procedure has been adopted this year, Admiral de Lapeyrère having been authorised to bring in a Bill providing for the placing of orders for two additional battleships of the Jean Bart class, 23,096 tons. The Chamber sanctioned that these ships should be constructed in private yards, a saving of eight months being thus effected as compared with the time which would be required by the dockyards. In March the

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Senate Naval Committee approved the decisions of the Chamber with some modifications. A sum of £180,000 has been added to the Estimates for commencing the construction of the new ships, which, it was explained, would be capable of holding their own against the latest type of foreign ships, and would carry the same armament as the Jean Bart. The 13·4-in. gun had not yet been perfected, but experiments were still in progress, and the new gun would be mounted in next year's ships (see Part III.). The Minister of Marine also asked the Chamber to authorize credits for two additional large dry-docks at Toulon.

M. Delcassé, president of the Navy Committee of the Chamber, succeeded Admiral Boué de Lapeyrère in the Ministry formed by M. Monis. He steadfastly maintains the policy of his predecessor. Already, in the Chamber, he had explained the provisions of the programme, by which the composition of the Fleet was fixed at 28 battleships, 10 scouts, 52 destroyers, and 94 submarines. Provision was to be made for the renewal of these ships in rotation when they had reached a fixed age-limit. The total cost, including expenditure for docks and dockyards, would amount to £54,000,000, which would be spread over a period of ten years. The average annual expenditure on these Votes would therefore amount to £5,400,000, as compared with an existing expenditure of £4,800,000. For the additional sum of only £600,000 the country would obtain a considerable increase of security. M. Delcassé wished it to be clearly understood that the programme could be voted in its entirety without prejudice to Parliamentary control of the annual credits, and declared that if this were done the Chamber would grant the sums required to bring the resources of the dockyards up to date.

The Vergniaud, last of the Danton class to take the water, was launched at the Chantiers de la Gironde, Bordeaux, April 12th, 1910. She was laid down in November, 1907, and, like many other vessels, has been delayed. Want of boilers and engines retarded the Patrie class, and the Dantons have been affected in the same way, and by changes in the plans. Electric boat hoists, refrigerating apparatus, improved ammunition hoists, and other alterations cost £120,000 for the whole class. The Danton, Diderot, Condorcet, Mirabeau and Voltaire began their trials in 1910. In November the last-named attained a speed of 18·75 knots in the last of her preliminary trials with three-fourths of her fires lighted. There was some damage to her turbines, however, and she went back to La Seyne. It has since been stated that the blading was unsatisfactory, and that 13,000 blades were broken or stripped. The first trials of the Condorcet in November were satisfactory, but there was trouble with her turbines

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also. They were repaired, and she attained a speed of 19·8 knots on a full-power trial in the Baie des Glénans, while the contract was 19 knots. The Diderot had trouble with her turbines at Saint Nazaire, the blading being damaged.* Something of the same kind is said to have occurred in the Danton, which was also injured through failure to stop, or want of power to reverse her engines, causing her to touch the bottom slightly at Brest and injure some plates and two of her propellers. Her turbines were overhauled and repaired. In February the Minister ordered the trials of the Mirabeau to be interrupted in order that her turbines might be opened up and the blading altered. The Fantassin and other destroyers have had similar trouble. Evidently the French require further experience in the blading of turbines. The difficulties encountered have led to a rumour that in the battleships recently authorised there will be a return to reciprocating engines. The new ships are far from complete, and some of the trials have been run without guns or mountings on board.

The battleship Suffren, which has been repaired, was running trials at Toulon in November, when the starboard propeller shaft broke and the screw fell to the bottom.

Armoured cruisers.

The armoured cruiser Edgard Quinet, though she failed to attain the same speed as the Ernest Renan, armoured cruiser, was successful on her trials. The following are the results: Ten hours' forced draught run, 40 boilers, 36,823 I.H.P., 23·8 knots; three hours' forced draught, 30 boilers, 39,803 I.H.P., 23·92 knots; 24 hours' full speed without forcing, 40 boilers, 25,416 I.H.P., 21·93 knots; six hours' consumption trial, 20 boilers, 16,705 I.H.P., 19·55 knots. The consumption was considerably less than the contract. In her preliminary trials in January the Waldeck-Rousseau, at the Baie des Glénans, steamed at 21·06 knots with 22,666 I.H.P. and at full speed 23·64 knots with 35,329 I.H.P. Beginning her official trials in February, the cruiser worked up to a mean of 25 knots, when a shock was felt on board, and on examination it was found that two blades of the port screw were injured and the shaft bent. The cruiser was supposed to have struck some submerged obstruction.

Destroyers.

The destroyers Glaive and Poignard, 335 tons, have both been completed for service. Their construction had been suspended for some time at Rochefort to enable the submersibles of 1905 type to be carried forward. The Lansquenet (completed 1909), 469 tons, as well as the Fantassin, have also entered the service. The last named attained 30·5 knots, and on her six hours' full speed trial 29 knots. All these have reciprocating engines. The Janissaire, launched April 12, 1910, and subsequent boats have Parsons turbines and oil

* The Diderot completed her trials at Brest, attaining a speed of 19·48 knots.

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stoking. The Janissaire steamed 28·5 hours on her six hours' trial. The trials of the Cavalier, which was launched May 9, 1910, were interrupted by damage to her turbines, but she had attained a speed of 31·2 knots. The Cimeterre and five other 730-ton destroyers are expected to undergo trials in 1911.

Of the submersibles, the Vendémiaire, last of the Pluviôse class and last to have steam for surface propulsion, was launched July 7, and is officially stated to have been completed. The Saphir, Topaze and Turquoise (Emeraude class), and the Cugnot, Giffard, Fresnel, Ampère, Gay Lussac and Archimède are also ready. Sixteen boats of the Brumaire class are in hand, but many of them have been delayed by failure to deliver their boilers. The submarines Lutin and Morse have been removed from the list. The Omega has been re-named Argonaute, a torpedo-boat of that name having been scrapped, and "X" is now known as Dauphin. The new submersibles are to have three telephone buoys detachable severally at the bow, stern and amidships, and some of the existing boats are being fitted in this way, as well as with rings for the attachment of cables in case of foundering. The Clorinde and Cornélie (394 tons) are building at Rochefort, and the Gustave Zédé and Néréide (728 tons) at Cherbourg. The latter are likely to be much delayed. A submarine or sub-surface boat, known as SC 1, which does not yet appear in the official lists, was launched privately at Châlons-sur-Saône (MM. Schneider's yard) on June 16. She has been designed by M. Laubeuf, and displaces 300–440 tons. Two Schneider-Carels petrol motors (800 H.P. together) are provided for surface navigation, 14 knots, and two electric motors, 200 H.P., for submerged propulsion, 9 knots. The boat has four torpedo-tubes on a new system, three pairs of horizontal rudders, safety keel and four telephone buoys. She can submerge in five minutes. The surface range is 2000 miles, and submerged range 80 miles. The boat has no conning tower, but there are two short funnel-like objects, probably for ventilation. An experimental destroyer, the Acté, has also been built by MM. Schneider, 475 tons, 12,000 I.H.P., 35 knots.

Sub-mersibles.

A sad disaster to the submersible Pluviôse occurred off Calais on May 26, when, through collision with the mail-boat Pas de Calais, she went down with all hands. Commander Prat, commanding the flotilla, Lieutenant Callot, commanding the boat, Sub-Lieutenant Engel, second in command, and 24 men were lost by this catastrophe. The outer hull, ballast tank and inner wall of the boat were so broken by an injury, which extended for a length of 16 feet, that nothing could have kept the boat afloat, and she went down by the bow in nine fathoms of water. There were great difficulties in raising the

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boat, and she was not towed into the harbour until the night of June 10, and not until June 21 was she brought into dock. The unfortunate boat has since been overhauled, repaired, and completed for service.

The Loutre had a narrow escape near La Pallice on March 16th. Navigating submerged, the periscope disclosed the presence of a steamship approaching on a line that made collision inevitable. The water being shallow, it was impossible to plunge deeper, but by skilful manœuvring the officer in command, Lieut. Labary, secured that the collision should take place at a small angle of incidence. The leaden keel was dropped after the shock, and not much damage was done, but it was necessary to run the boat ashore on the sands. She has since been floated and repaired.

GERMANY.

The *Marine Rundschau*, in opening its retrospect of the year 1910, made the remark that the situation internationally was more satisfactory, because in England a more reasonable view appeared to be taken of the purpose and object of the German Fleet. Less was heard of the *deutsche Gefahr und die deutsche Flotte*, and the stories of a German invasion of this country were seen to be ridiculous (*komisch*), and did nothing to raise the prestige of England in the world. Therefore the *Rundschau* hoped it was possible to look forward to the great work of England and Germany in the world in a spirit of friendship. At the same time the journal, which is directed from the Intelligence Branch of the Imperial Navy Office, could not regard with favour the claim for absolute British supremacy on the ground that this attitude would seem unfriendly to all other Powers, and would place their world interests *à la merci* of Great Britain. What would the world think if the German Army were made so powerful that it could crush all other armies?

Navy Law programme.

The following table, in continuation of that given last year, indicates the vessels yet to be built under the Navy Law, beginning with those voted for 1911, as set forth under the existing scheme. It should be noted that a division of destroyers consists of six boats, twelve boats being built annually:—

	Battleships.	Armoured Cruisers.	Small Cruisers.	Division of Destroyers.
1911	2 + 1 A	1 A	2	2
1912	1	1	2	2
1913	1	1	2	2
1914	1	1	2	2
1915	1	1	2	2
1916	1	1	2	2
1917	1	1	1 + 1 A	2
	9	7	14	14

A = additional ships.

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With reference to the practical execution of the German Navy Law a good deal of discussion has recently taken place. In the House of Commons and elsewhere, Mr. Asquith, Mr. Balfour, Mr. McKenna, and Lord Charles Beresford had made statements concerning the relative naval situation of Great Britain and Germany which could only have been justified by the acceleration of the German programme. Questioned as to when a forecast (made in the House on March 16th, 1909), concerning the probable strength of the German Navy in 1910–13, was found to be a mistake, Mr. McKenna made an important statement as follows on February 17th, 1911 :—

That forecast was founded on the fact that, in addition to orders having been given in advance of the beginning of the financial year for component parts of the ships of the German 1909-10 programme, the contracts for two of these ships had been promised in the autumn of 1908, and the keel plate of one of them had been laid at least two months before I spoke. There has been no contradiction of these facts, and the presumption to which they gave rise, that the anticipation of the beginning of the German 1909-10 programme might be followed by an anticipation of the date of its final completion, was strengthened by the fact that much larger sums were asked for as first instalments in payment for the 1908-9 and 1909-10 ships than in the case of the ships laid down in the preceding year. We now know that the early promise of contracts was made only for financial and labour reasons, that the large first instalments for the 1908-9 and 1909-10 ships meant not a faster rate of construction, but the building of ships of much greater cost, and that there is no intention on the part of Germany to deliver her ships from the shipyards at dates in anticipation of the year in which the final instalments are voted. I am now happily in possession of official information as to the dates when the German ships are expected to be delivered from the shipyards.

Battleships.

The battleships Rheinland and Posen (programme 1907–8) were completed in 1910, and are now in commission. The building period of the first four German Dreadnoughts in months was as follows :— Nassau, 40; Westfalen and Rheinland, 37; Posen, 38. The Ostfriesland, Helgoland and Thüringen (programme 1908–9) are to be completed this year. Of the ships of 1909–10, the Oldenburg, for reasons connected with labour supply, was laid down in anticipation of the customary date, and was launched June 30th, 1910. She is to be completed early in 1912, in which year the Ersatz Hildebrand and Ersatz Heimdall will join the fleet. The former was launched on March 22, and has been named Kaiser. The Ersätze Hagen, Ægir and Odin, of the 1910–11 programme, are down for completion in 1913, and the two Ersätze provided for this year (Wiessenburg and Kurfürst Friedrich Wilhelm), as well as another battleship known as S, which is an additional ship, intended to complete the establishment of 38 battleships provided for by the Navy Law, should be ready in 1914.

The old Weissenburg and K. Fried. Wilhelm have been sold to Turkey, as well as the four destroyers, S 165–S 168, which were built by Schichau for the German Fleet.

Helgoland class.

A description was given of the Nassau class in the *Naval Annual* last year. No definite particulars are available concerning their

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successors, but it is believed that they carry 12-in. guns instead of 11-in., and twelve 5·9-in., and it is known that the big guns are mounted on the same plan as in the Nassau. This arrangement has been the subject of much adverse comment, as with the 12 guns there is a broadside fire of eight guns only, but the Germans are understood to base their plan upon the consideration that a ship may be engaged on both sides at the same time, and that in the other case there will be four guns in reserve. The problem of embodying an armament of 12 big guns, and 12 5·9-in., as well as 16 smaller, and six submerged torpedo tubes, in a ship of 18,200 tons, has been very difficult, and there are various opinions as to the solution.

Battle-cruisers. Von der Tann.

Of the battle-cruiser Von der Tann (programme, 1907–8), "Nauticus" gives the following details, which, except as regards armament, are practically the same as given in last year's *Naval Annual*:— Displacement, about 18,700 tons; length, 561 ft.; beam, 87 ft.; draught, 26 ft. 7 in.; armament, eight 11-in., ten 5·9-in., sixteen 3·4-in.; 41,000 I.H.P., 18 "marine" type boilers; speed, over 24 knots; coal capacity, 1000 tons normal, 2800 tons maximum. The eight heavy guns are in four turrets, placed similarly to those of the Invincible, except that the starboard turret is forward and the port turret abaft of midships. The turrets train in such a way as to permit of six guns being fired ahead or astern, while the whole eight can be fired on the broadside. The intermediate armament is placed in an armoured battery amidships. The cruiser has two funnels and two light pole masts. The Von der Tann is the first heavy German cruiser to be fitted with turbine engines. During her preliminary trials the Parsons turbines are officially stated to have developed 71,500 H.P., and the cruiser attained a speed of 27·63 knots. Some statements were made that the gunnery trials were not a complete success, but this was denied. Count Reventlow said in the *Deutsche Tageszeitung* that the trials and experimental firing were carried out with especial thoroughness, in view of the novelty of this type of cruiser—the first German large cruisers to carry eight 11-in. guns. In the course of the trials neither guns nor ship showed any defects or injuries, and no sort of ill effects from the firing had made their appearance since the trials. "If after gunnery practice of this kind the ship went into dock, that had nothing to do with the gunnery practice." The Von der Tann left Kiel on February 21, 1911, for a cruise in South American waters.

One battle-cruiser is laid down each year under the Navy Law, and all have been built or are building at Messrs. Blohm and Voss's splendid yard at Hamburg, which is fitted with every requirement for rapid work, and has a great turbine equipment. The Moltke

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(1908–9) was launched April 7, 1910. The following particulars are given under reserve:—Displacement, 21,500 tons; length, 600 ft.; beam, 88 ft.; armament, eight 12-in. and ten 5·9-in. guns. "H" was launched March 28th, 1911, and received the name of Goeben. "J" is on the stocks, and "K" is provided for in the Estimates of 1911. Of these no definite particulars are available. The last-named should be completed in 1914.

Here it may be remarked that the Navy Law provides for 20 battle-cruisers, in addition to 38 battleships, so that the total number of Dreadnoughts will be 58. The ships provided for in 1911, to be completed in 1914, will give Germany in that year 21 Dreadnoughts, the total number being completed by pre-Dreadnoughts, which will henceforth be replaced on the age system laid down.

Small cruisers.

Particulars are not available of German small cruisers subsequent to the Köln and Augsburg, which displace 4280 tons, and are 401 ft. 9 in. long, with 46 ft. beam, and 16 ft. 5 in. draught. Like the Dresden and Emden, they carry twelve 40-calibre 4·1-in., four 55-calibre 2·1-in., and four machine guns, and have four submerged torpedo tubes. These are turbine vessels, with 20,000 I.H.P., and 26 knots speed, but on trial a mean of 27·2 has been obtained. The Köln and Augsburg were to join the Service in 1911. Two others (Ersätze) belong to each subsequent year, and are to be completed as follows: E. Bussard and Falke, 1912; E. Cormoran and Condor, 1912 or 1913; and E. Seeadler and Geier (1911–12), 1913 or 1914. The latter cruisers carry two 5·9-in. and ten 4·1-in., and it is stated that the E. Cormoran and E. Condor will be armed with 6·7-in. guns.

Destroyers.

The whole of the destroyers of the 1909–10 programme—640 tons, 32½ knots—are completed; 12 (G 186–191 and V 192–197) are rapidly approaching completion, and 12 more have been provided for 1911–12; six of these are building at the Germania Yard. The G boats (Germania Yard) have Germania turbines, and the V boats (Vulcan Yard) A.E.G. turbines.

The disaster to U 3.

Submersible boat U 3 sank in Kiel Harbour on January 17th, and was docked two days later. At the time of this lamentable disaster the boat was engaged with U 1 in practice in filling the tanks for submersion to the awash position. Water began to pour into the engine-room by the valve of the ventilation mast, owing, it was stated, to the shaft actuating the valve being slightly rusted, preventing proper closing, while the indicator pointed to the "shut" position. The commander ordered the stern ballast tank to be emptied, and an effort was made to keep down the water with the bilge pump The safety keel was let go, and the telephone buoy was

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sent up to the surface. Water, however, continued to pour into the engine-room, and the crew withdrew into the midships section, closing the bulkhead, which at first held firm. Meanwhile the heeling of the boat had overturned acids in the accumulator cells, causing short circuiting, and some vulcanite fittings began to smoulder. The vapours given off were such that the commander ordered the crew to retire into the fourth (torpedo) section. He himself remained in the midships section and began to empty the forward tanks so as to bring the section where the crew were collected to the surface. He refused to follow them, and when the fumes of chloride became intolerable retired into the conning-tower. Shortly afterwards the midships section was also filled with incoming water, and communication with the outside by means of the telephone buoy was then cut off. The men in the fourth section, who suffered considerably from the fumes, remained packed together until their release. The Vulcan, parent and salvage ship, was in the vicinity, but a crane from the dockyard had proceeded to the scene of the disaster; and hoisting tackle had already been fixed in position by divers when the Vulcan arrived, it being supposed that all the crew were in the forward part of the vessel, which the crane was able to raise. When it was ascertained that the commanding officer and two others were in the conning-tower, communication was established with them by holding written tablets in front of the periscopes, the men inside replying by motions of the periscopes. At first their condition was satisfactory, but later on they gave unfavourable answers. Attempts were then made to renew the air-supply in the conning-tower by means of the periscopes, but this was unavailing. A second crane was brought up, and efforts were made with its help to raise the stern of the boat. Twice the hoisting tackle broke, and it was then recognised that it would be necessary for the bow of the submarine to be sunk in order that the Vulcan might raise the boat from a horizontal position. This was done, and the submarine was opened and docked. Twenty-eight officers and men were on board, of whom 25 were rescued, but the commanding officer, a lieutenant, and one of the crew lost their lives by this deplorable accident. Orders and medals were issued by the Emperor to those who had suffered and had distinguished themselves by assisting in the arduous work of salvage.

Sub-marine flotilla.

By the end of 1911 the Germans will have 12 submersibles in commission or ready for service, and already a special flotilla for the North Sea coast has been formed. The disaster to U 3 was admittedly due to a mischance, and did not reveal the existence of any structural defect. U 1 and several others have been built at the Germania

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Yard, Kiel, and are of what is known as the Germania type. The boats built at Danzig are analogous. In endurance trials some of the boats have cruised in bad weather for a distance of over 540 miles at a mean surface speed of 12·5 knots. The inner body is cylindrical in section, with the conning-tower attached, and the space between this inner body and the outer hull provides space for water ballast and petrol tanks. The water tanks are located amidships and at either end, between them being the petrol reservoirs, this arrangement being intended to reduce the danger of explosion. As each petrol tank is emptied loss of weight is automatically compensated by an inflow of water. The machinery consists of two double-action Diesel motors with 600 aggregate H.P., driving two propellers, and an auxiliary motor of 320 H.P. for actuating the diving rudders. U 3 has several times achieved a surface speed of 15 knots, and a submerged speed of 8·5 knots, the range of action being 1500 miles on the surface and 60 miles submerged. The time occupied in preparing to dive is from three to five minutes, but the actual operation is 15 seconds. To return to the surface requires 30 seconds. The air-supply is such that with a crew of 13 the boats can remain submerged for a space of 24 hours. Beneath the hull is fixed a drop-keel of 5 tons, which can be instantly released from the interior in case of need, while the ballast tanks are emptied by air pressure, further decreasing the weight by 20 to 30 per cent. There are strong rings by which the lifting chains of the Vulcan or a powerful crane can obtain sufficient hold. In relation to the structural strength of the boats, the collision of U 4 with the steamship Capella on February 18th, 1910, may be recalled. The accident occurred in the Kiel Canal, and the submarine, though seriously damaged, remained afloat.

Fleet operations.

Very little that can be called authentic is published concerning the operations and manœuvres of the German Fleet. Last year, for the first time, the First Squadron of the High Sea Fleet was based on Wilhelmshaven. The men enter in the autumn for two years' service, and until the spring the work of training is conducted in the ships and squadrons. Then the men in the reserve or *Stammschiffe* are put through a severe sea training, which includes much torpedo work and night attacks. Last year there were manœuvres of attack and defence in relation to Borkum, the mouth of the Elbe, the entrance to the Kaiser Wilhelm Canal, Heligoland, and the Frisian Islands. The summer manœuvres followed. This year the *Stammschiffe* were to take a month's instruction cruise in Baltic waters, the whole period being devoted to torpedo exercises, and four torpedo-boat flotillas and ten submarines were to be engaged under command of

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Rear-Admiral Lans, on the Pomeranian coast, with Swinemünde and Sassnitz as bases. For the first time the submarines have formed a distinct section of the squadron, and operations were projected to investigate the co-operation between surface and under-water torpedo craft. Another interesting feature was to be trials made with a new type of net, which is said to have been supplied to all battleships and cruisers.

ITALY.

Battle-ships.

The Dante Alighieri, first of Italian Dreadnoughts, laid down in June, 1909, was launched at Castellammare on August 20, and is completing at Spezia. She was designed by the late Lieut.-Gen. Eduardo Masdea, of the Italian Corps of Naval Constructors, and has been constructed with greater rapidity than recent Italian ships, about 500 tons of material having been built into the hull each month. The particulars following are from the *Popolo Romano*. The displacement of the ship is 18,300 tons; length, 505 ft. 1 in.; beam, 70 ft.; mean draught, 27 ft. 3 in. It is believed that the side armour will be 10 in. thick, reducing to 6 in., and the barbette armour 10 in. The main armament will consist of twelve 12-in. 46-calibre guns in four triple turrets on the middle line, giving a fire of three guns ahead, three astern, and 12 on either broadside. There will also be twenty 5·5-in. guns, of which eight will be mounted in double turrets and 12 on pedestal mounts in the citadel and thirteen 12-pdrs.; two lateral torpedo tubes and one at the bow. The machinery has been constructed by Messrs. Ansaldo, Armstrong, at Sampierdarena, and is of 26,000 H.P., divided into three groups of Parsons turbines, with 23 Blechynden water-tube boilers. The boilers are for coal stoking, but there is also oil-burning apparatus. There are four funnels on the middle line. The auxiliary machinery has a total weight of nearly 2000 tons. In relation to the displacement and draught of the ship, the following facts are of interest. It is now officially admitted that the Dante is likely to exceed her intended displacement by about 1200 tons, but the Minister of Marine has assured a correspondent that no anxiety need be felt upon the subject. A certain reduction of the superstructure might lighten the ship by 280 tons. Speed may be reduced to the extent of one-tenth of a knot or more. She is expected to be nearly 16 in. deeper in the water than was intended, which might seem a serious matter. Rear-Admiral Astuto, however, writing in the *Rivista Nautica*, says that Italian ships are not well protected below water, and that if they roll more than 3 deg. the unprotected portion of the hull is exposed. He even seems to suggest that from this point of view the increased displacement may be advantageous,

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but he does not appear to have referred to the reduced elevation of the guns above the water line. If the suggested reduction of the superstructure should take place, the ship will not sink more than 12 in. below the line intended. The Dante may be completed next year, but more probably in 1913.

The Conti de Cavour, which is building at Spezia, may be launched on August 10; the Giulio Cesare, at the Ansaldo Yard, Genoa, and the Leonardo da Vinci, at the Odero Yard, Genoa, in July. The two last named are to be ready for trial under contract by December 31, 1912, and the Minister of Marine has stated that the Cavour will be completed early in 1914, if there should be no delay in the delivery of her armour. In plan these ships* are likely to differ from the Dante Alighieri in having thirteen 12-in. guns in five barbettes. The design shows three guns in the forward barbette, another barbette with two guns firing over it, a barbette with three guns amidships, and the arrangement of the forward guns repeated abaft. There would thus be five guns firing ahead and astern, and 13 on either broadside. This plan may be modified, and the ships may be given ten heavier guns in five double barbettes.

It has lately been stated, in the Austrian semi-official *Mitteilungen* and in many Austrian papers, that plans for four additional Dreadnoughts of 25,000 tons displacement, armed with twelve 13·5 in. guns, have been under consideration in the Italian Ministry of Marine, and that they will be laid down as soon as the launch of the Conti di Cavour, Leonardo da Vinci, and Giulio Cesare shall have set free the berths on which these vessels are being built. Italy might thus have eight Dreadnoughts and super-Dreadnoughts in commission by 1915. It is, however, extremely unlikely that Italian shipbuilding will proceed so rapidly.

Scout-cruisers.

The scout-cruisers Marsala and Nino Bixio have been put in hand at Castellammare, and a sister, the Quarto, is being built at Venice. Displacement, 3400 tons; length, 460 ft. 3 in.; beam, 42 ft. 8 in.; mean draught, 13 ft. 3 in.; six 4·7-in. and 12-pdr. guns; three torpedo tubes; Curtis turbines; 22,500 S.H.P.; speed, 27 knots.

Destroyers.

Orders have been issued for the building of six destroyers of 615 tons and 12 sea-going torpedo-boats. The destroyers will be named Impavido, Intrepido, Indomito, Impetuoso, Irrequieto, and Insidioso. Messrs. Orlando are building four of the boats at Leghorn—246 ft. long, 24 ft. 6 in. beam, 7 ft. 6 in. draught; armament, one 4·7-in., four 12-pdrs., two 18-in. tubes. Two of these will be on Thornycroft designs with Parsons turbines, and the others after

* Particulars of these ships are given in Part II. They were received too late for insertion here.

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Messrs. Orlando's plans, with Zoelly turbines, 14,000 S.H.P., 30 knots. Eighteen smaller torpedo boats have been put in hand, and the intended series will be known as "1 P.N." to "12 P.N." (Pattison, Naples), "O.S. 13" to "O.S. 24" (Orlando, Sestri Ponente), and "A.S. 25" to "A.S. 30" (Ansaldo, Armstrong). Two of the "P." boats have attained 30 knots on trial.

Sub-marines.

The submersible Foca has been reconstructed after her disaster. The following twelve submersibles have been put in hand in Italy:—Nautilus and Nereide (Venice), 400 tons; Velella, Fantina, Medusa, Fisalia, Argo, Salpa, Zoea, and Falea (Muggiano), Laurenti Fiat type; and Giacinto Pullino and Galileo Ferraris (Spezia), 400 tons. A boat named the Atropo is being built at the Germania Yard, Kiel. Two of the Laurenti type, 236 tons submerged, are being constructed by Messrs. Orlando at Leghorn. Each has two heavy oil motors driving the two screws, for a surface speed of 14 knots and 9 knots submerged, with accumulators, which can be charged by a dynamo coupled to the engines.

The construction of a large dry dock and canal of approach at Venice has been undertaken by an Italian contractor. There will be a harbour basin, 3925 ft. long, 656 feet broad, and 32 ft. 10 in. deep, and a canal of approach of the latter depth at Bottenighi, in the vicinity of Mestre. The work is to be completed within 52 months.

In the year 1910–11 the following vessels will be removed from the fleet:—Vesuvio, Caprera, Urania, eight second-class torpedo-boats and two of the third class; besides other vessels long since struck out of the lists in the *Naval Annual*.

Torpedo-boats 64, 85, and 148 have been removed from the list, and three others are employed by the Customs service.

Austria-Hungary.

Policy.

The situation and expansion of the Austro-Hungarian Navy occupy increasing attention in Europe, and the significance of the movement that is in progress is undeniably great. Admiral Count Montecuccoli, chief of the Naval Department, explained in the *Magyar Figyloc*, Count Stephen Tisza's new review, the national object that is in view. He said that the country could not endure a blockade of the Adriatic by a hostile fleet, and that a strong fleet, protecting the coast, would relieve the military of some responsibilities, and enable the Army to dispense with concentration on the coast. Hence the importance to Hungary. The Empire, therefore, is to seek to exercise influence in the Adriatic and the eastern part of the Mediterranean. This is to be the basis of her strength. The Admiral discountenanced altogether the notion of acting on the

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defensive, and said the principle must be to damage the foe. He concluded by expressing the view that the Austro-Hungarian Fleet might be compared with the fleets of other naval Powers, because, in case of warlike complications, the Mediterranean fleets of Powers with Atlantic coasts could not be greatly reinforced.

The "unofficial Dreadnoughts."

The Admiral made last October his long-expected statement concerning the construction of the "unofficial Dreadnoughts" at Trieste. He said that in July, 1909, two slips had become vacant in the yard of the Stabilimento Tecnico, and the company had applied for orders which he could not give, although battleships were urgently needed. In order to avoid a partial suspension of work and the discharge of hands, the Stabilimento had offered to build on its own account two battleships, according to plans to be sanctioned by the Naval Department. In view of the feverish activity in the naval arsenals of the great Powers, and even of Spain and Turkey, it was impossible for Austria-Hungary to lag behind. After mature reflection, as the official responsible for the fighting power of the Navy, the Admiral requested "the competent personages" to accept the offer of the Stabilimento, and after due consideration of the circumstances, which made further delay appear inexpedient, these personages and he had accepted the offer. It was evident, however, he continued, that the Stabilimento counted upon the ships being taken over by the Naval Department as soon as the requisite funds should have been constitutionally granted. By placing the plans for these ships at the disposal of the Stabilimento, the Department obtained the advantage of being able, provided the Delegations granted the means, to have these ships ready at an early date. But neither the price agreed upon nor any instalment has been paid by the Austrian or the Hungarian Government, and the budgetary rights of the Delegations had been completely respected.

In relation to this matter, a strong feeling was expressed that Hungary should have her share in the future work of construction; and the Hungarian Government has taken steps, by granting assistance to the extent of three million crowns, to increase the capacity of the Danubius Yard at Bergudi, near Fiume, of which Herr Zweig has been appointed director. The yard will not be ready to undertake large ship building until 1912. Hungary is also willing to open a gun factory at Diosgyör, 140 kilometres from Budapest.

The first of the Dreadnoughts will be named Kaiser Franz Josef,* will be launched at Trieste in May or June, and be completed for service in December, 1912. The second will be named the

* Viribus Unitis (?). Dimensions, etc., from the *Times* of April 6th are given in Part II.

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Tegetthoff, will be launched in November, and should be completed in March, 1913. The financial provision for these is given below. It is stated officially that the ships displace 20,400 tons, and have an armament of twelve 12-in. guns in four turrets on the middle line, as well as sixteen 3-in. and 24 smaller guns. Their turbines are said, by the *Zeit*, to be of 50,000 I:H.P., giving a speed of 23 knots. The third Dreadnought will be laid down at Trieste as soon as the first has been launched, and the fourth at the Danubius Yard. Officially these vessels are numbered IV.–VII.

Programme.

After the completion, in 1916, of the present naval programme, the Fleet will number 13 battleships, being three Habsburgs, three Erzherzogs, three Radetzkys, and four Dreadnoughts, with nine cruisers, 18 destroyers, 48 torpedo-boats, and 12 submarines. The strength, according to the Naval Minister's view, should be an establishment of 16 battleships, 12 cruisers, 24 destroyers, 72 torpedo-boats, and 12 submarines, so that the fresh constructions to be carried out between 1916 and 1920 would comprise three battleships, three cruisers, six destroyers, and 24 torpedo-boats. The intended limit of age for battleships is 20 years, of cruisers and destroyers 15 years, of torpedo-boats 12 years. Admiral Montecuccoli says it is not advisable always to be resorting to extraordinary appropriations, which cause uneasiness both at home and abroad. "No Navy," he stated, "whatever its size, is so costly as a war." Similar sentiments were expressed by Captain Lucich, who spoke in his name: "We require a Fleet prepared for the outbreak of an eventual war, whose attack would be feared by the enemy. A Fleet which is intended only for defence, and must withdraw before the enemy, is valueless." Hence there is a programme, but no Navy Law.

Admiral Montecuccoli has strongly expressed the view that the increasing cost of the Navy is a natural phenomenon. Battleships, he says, used to cost £800,000; now they cost three times as much. Hospitals, magazines, barracks, and docks all need to be correspondingly enlarged. But the first place must be given to ships. His object is to raise the Fleet to the relative position it held in the sixties. Then the displacement of ships varied between 1000 and 6000 tons; now it has been quadrupled. Artillery and other weapons have been developed in a manner never dreamed of, and due regard must be paid to these changed conditions.

Estimates.

The 1911 Estimates were issued to the Hungarian Delegation on January 24, the total cost of the new shipbuilding programme being estimated at £13,016,066, to be spread over six years. The instalment for 1911 is £2,291,666. The programme includes the four Dreadnoughts above referred to (estimated aggregate cost £10,100,000),

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being the two in course of construction and two others to be laid down; three cruisers of about 3500 tons (Admiral Spaun class; estimated cost, £1,250,000); six destroyers of about 800 tons (estimated cost, £750,000); 12 sea-going torpedo-boats (estimated cost, £500,000); and six submarines (estimated cost, £416,666). Supplementary Estimates for the battleships of the Radetzky class show changes of construction due to recent technical developments, the desirability of increasing the rapidity of the fire of turret guns, and the enhanced cost of armour and artillery, necessitating additional outlay amounting to £213,000 on each of these vessels. Exclusive of the special shipbuilding instalment of £2,291,666, the Naval Estimates for 1911 amount to £2,844,000. They make provision for an increase of 800 men in the *personnel* of the Navy, and the supplementary outlay on the battleships of the Radetzky class. The total Naval Estimates for 1911, therefore, amount to £5,135,666.

M. Julius Rosenberg, Hungarian reporter on the Estimates, states that if the Empire intends to maintain the Navy at the strength proposed, taxpayers must be prepared to spend annually some £3,000,000 for shipbuilding, so that from 1915 or 1916 onwards there will be an annual naval budget of £6,200,000. He is careful to insist that the sphere of activity of the Navy would never be in the great oceans, but in the Adriatic and the Eastern Mediterranean, where the Mediterranean fleets alone would probably have to be reckoned with. It is impossible, he says, seriously to entertain the view that naval efforts are inspired less by national well-considered interests than by those of the northern ally, whose Navy the new Dreadnoughts reinforce. Though the strength of its Navy affects the value of a State as an ally, the position is to-day that it is not this point of view, but the necessities of the nation's own safety that come into consideration. In this aspect, he said, the question of the Austro-Hungarian naval programme resolves itself into one of internal expediency.

The Hungarian Delegation adopted the Estimates on February 28 without modifications, thus sanctioning the expenditure of £13,000,000 on the programme to be completed in 1916, and the Austrian Delegation has given its approval.

Battleships.

The Erzherzog Franz Ferdinand class were described in the *Naval Annual* last year. The Erzherzog Franz Ferdinand attained a speed of 16 knots on a twelve hours' run on April 15, 1910, with seven boilers at work. On her full-power trials she attained a speed of 20·58 knots, with 26,000 I.H.P.

The Radetzky began her trials in September, and joined the squadron at the end of last year. The Zrinyi, launched April 12, 1910, will follow in the autumn of 1911.

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Torpedo craft.

The last of the torpedo-boats of 197 tons, built by the Danubius Yard, Fiume, was launched at the end of May, 1910. The total number completed or completing, including twelve 110-ton boats, is now 42.

Six submarines have been built, and another (U 7) is in hand. It is stated that two Lake submarines did not give satisfaction at their trials.

Docks.

At the Danubius Yard a depôt and salvage ship for submarines is in hand—950 tons, 15 knots, and an armament of some 2·8-in. guns.

A floating dock of large capacity is nearing completion.

Personnel.

An increase of the *personnel* is to take place in the proportion of 10 per cent. for officers and engineers, while within eight to ten years there is to be a progressive increase of the men from 14,000 to 20,000.

JAPAN.

Policy and programmes.

The maintenance of the Navy at an adequate standard, and its expansion to meet future contingencies, is becoming a question of great political importance in Japan. Financial depression subsequent to the war resulted in some retardation of construction, and the hope has been disappointed that Japan can henceforth rely entirely upon her own shipbuilding resources, and in particular upon her supplies of steel and other material. The third period of expansion, which was intended to cover the period 1903–11, has been extended to the year 1915–16, and in some matters to 1916–17. This *ante-bellum* programme provided for three battleships and three armoured cruisers, or battle-cruisers, as well as some smaller vessels, and a sum of £10,000,000 was required. For the purpose of the war an emergency fund was raised, and out of this the Government, without consulting the Diet, which was, indeed, unnecessary, appropriated a sum of about £20,000,000 to what was called "supplementing and implementing" the Navy. Including the "*ante-bellum*" scheme, the programme provided for eight battleships, of which six (Katori, Kashima, Aki, Satsuma, Kawachi, and Settsu) have been built or are completing, nine armoured or battle cruisers (Ibuki, Tsukuba, Ikoma, Kurama, the vessel recently ordered from Messrs. Vickers, Sons & Maxim, and four others yet to be built); five protected cruisers, of which one, the Tone, has been built, and some despatch vessels and torpedo craft. It therefore appears that two battleships and four other battle-cruisers have yet to be constructed, besides smaller craft, and in round figures the sum of £30,000,000 has been made available.

The economical situation of the country has, nevertheless, presented many difficulties since the war, and the future political objects of the Government cannot be attained without the goodwill of large

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capitalists and the commercial community. Accordingly, at the end of November, the Minister President received representatives of the industries of Osaka and Kobe, and the complications of the situation were explained and discussed, with the result that it may be possible not only to carry out the programme but to increase it. The Navy Estimates have grown from £7,205,201, in 1908–9, to £7,608,082, in 1909–10, and to £8,610,000 in 1910–11—an increase of £1,404,799 within two years—but this has been due to the inclusion of instalments from the sums formerly made available. As a matter of fact, no special provision has been necessary for new construction during the past seven years, because the Diet sanctioned in 1903 the *ante-bellum* scheme of £10,000,000, round figures, while £20,000,000 had become available from the war emergency funds, as is explained above.

Obsolescence of ships.

Figures have been prepared by the Japanese Admiralty showing the rapid obsolescence of vessels, which renders the laying down of additional vessels imperatively necessary. The following is the table of fighting ships as officially stated by the Japanese:—

	1909.	1916.	1920.
England	81	78	74
Germany	32	40	37
United States	37	38	26
France	28	?	40
Japan	25	14	8

This table is based on the obsolescence of battleships and armoured cruisers, as follows:—

	Battleships.		Armoured Cruisers.
1911	Fuji	13	Asama.
,,	Sagami (ex-Peresviet)	13	Tokiwa.
,,	—	11	Aso (ex-Bayan).
1913	Shikishima	13	Iwate.
,,	Hizen (ex-Retvizan)		—
,,	Mikasa		—
,,	Suwo (ex-Pobeida)		—
1914	Asahi		—
1915	Iwami (ex-Orel)	13	Kasuga. Nisshin.
1918	—	13	Tsukuba.
1919	—	13	Ikoma.
1920	Katori	13	Kurama.
,,	Kashima	13	Ibuki.

The above table results from a system of supersession from the first or fighting line, under which the "life" of the ship apparently consists of a period of 15 years from the date of launch, 13 years in the case of the captured ships and the Mikasa (which suffered serious damage), and 13 years for the armoured cruisers. The ships actually set down as in a state requiring replacement in 1911 are the Fuji, Asama, and Tokiwa. The Japanese calculations imply that the country must build 25 capital ships during the next ten years, involving an outlay of from £40,000,000 to £45,000,000.

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New construction.

The following table shows at a glance the present state of Japanese new construction :—

—	Programme.	Displacement.	Yard.	Laid Down.	Launched.	For Completion.
Aki . .	1903	19,800	Kure	March, 1906	April, 1907	1911
Kawachi.	1906	20,800	Kure	April, 1909	Oct., 1910	1912
Settsu .	1906	20,800	Yokosuka	Jan., 1909	—	1912
A . . .	1910	27,500	Barrow	Jan., 1911	—	1913
Kurama .	1903	14,620	Kure	Aug., 1905	Oct., 1907	1911
Yahagi .	1909	4,800	Nagasaki	1910	—	1912
Hirado .	1909	4,800	Kobe	1910	—	1912
Shikuma	1909	4,800	Sasebo	1910	—	1912

The Aki and the armoured cruiser Kurama began trials towards the end of last year, and were to be completed for service about April. The Kawachi was launched October 15, and is intended to be completed in 1912. Some doubt attends the completion of the Settsu in the same year. The battleship Satsuma, the armoured cruiser Ibuki, the reconstructed cruiser Tsugaru (ex Pallada), and the scout Tone have been completed for commission.

Battle-cruiser at Barrow.

The announcement that a contract had been signed on behalf of the Japanese Government with Messrs. Vickers, Sons and Maxim for the construction of a Dreadnought battle-cruiser was received with some surprise. It had been assumed, from the building of battleships of over 20,000 tons in Japan, that no further ships would be built abroad, but it is now known that Japanese resources do not enable work to go on rapidly and economically, and the authorities desired to take advantage of the experience of Messrs. Vickers in building a ship of what will practically be a new class. Messrs. Vickers have already built the Mikasa and Katori for Japan. The first keel-plate of the new Dreadnought was formally laid on January 17 by Captain Fujiwara, acting Chief Inspector of the Japanese Navy in London. The ship will displace between 27,000 and 28,000 tons, and the cost will be about £2,500,000. She is to be completed in the summer of 1913. No details are available.

Protected cruisers.

Three scout cruisers of the Tone class, improved and increased in displacement to about 4800 tons, are in hand as follows: Yahagi at the Mitsubishi yard, Nagasaki; the Hirado at the Kawasaki yard, Kobe, and the Shikuma at the Sasebo dockyard.

Torpedo craft.

The large destroyer Umikase, 1200 tons, 35 knots, has been launched at the Mitsubishi yard. She is a sister of the Kaifu, and another, the Yamakase, is in hand. The Inadzuma, 311 tons, built by Messrs. Yarrow in 1889, was sunk in collision and became a total loss.

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The submarine No. 6 sank at Kure, April 25, 1910, all the crew being drowned. She was raised and refitted for service.

At the Mitsubishi yard the large dry dock is to be further enlarged to the capacity of Dreadnoughts. Docking accommodation has been increased at Kure, Sasebo, and Maizeru. At Sasebo the largest dry dock in the Far East will be completed in August. Ryojun (Port Arthur) has been opened to commerce, but Masampo has been closed because of its neighbourhood to the new war harbour of Chinkaiwan, which latter place is being fortified. Kelung, at the northern end of Formosa, is also being fortified, and there are new batteries on Tokio Bay.

Russia.

The Duma and the Admiralty.

The difficulties that attend the creation of the new Navy of Russia have not yet been overcome. On the naval question the Duma has been split into fractions, but generally its attitude towards the Admiralty has been unfriendly, and it has been supported by a large section of the press. It was contended that the sums allotted in 1908 and 1909 to the building of the four battleships of the Gangut class had not been rightly expended, and the official explanations were not regarded as satisfactory. The total sum was £2,050,000, of which £306,000 had gone to the Obuchoff Works for ordnance—the remainder of the vote for that purpose being unexpended; £996,000 to the Admiralty yard; £320,000 to the Ishora yard; £202,500 to the Obuchoff Works (for shipbuilding), and £26,600 to Messrs. Blohm and Voss, of Hamburg, for the plans for a battleship. The Duma considered that the money had not been devoted to the objects intended, and that a large proportion of it had been employed for other purposes and on capital account. The attitude of the press may be understood from the fact that the *Kotlin*, which is a paper subventioned by the Russian Admiralty, in commenting on the circumstances, remarked that the irregularities rendered exceedingly difficult the voting of money for shipbuilding by the Duma. The situation became the more strained owing to statements circulated as to the supposed inferiority of the design of the new ships, of which it was said that they would be out of date before they were completed, while it was freely alleged that for the sum to be expended in Russia on four battleships, six of the same type could be built in England and five in countries of the Continent.

New construction.

Possibly some of the adverse criticisms passed upon the design are based upon misapprehension and imperfect information concerning the Gangut class. The armament will be twelve 12-in. guns mounted in four turrets, one forward, one abaft, and the two others, it is understood, échelonned on either beam, so as to give a fire of 12 guns

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on the broadside and nine right ahead and astern or broad on the bow and quarter. It is alleged, though there is no certainty on the point, that the secondary guns, sixteen 4·7-in., are to be in such close juxtaposition to the barbettes of the big gun that it will be impossible to use them in action. It is also reported that the magazines are not located sufficiently far inboard. The *Birievyia Viedomosti* states that the total weight of armour is 6750 tons, but it is alleged that the side armour will be too thin to keep out heavy shell, area of armouring having been considered more than adequate thickness, also that longitudinal sub-division is not carried sufficiently far, that the longitudinal bulkheads are too near the ship's sides, and that generally the compromise of qualities is unsatisfactory. Longitudinal bulkheads, 3 in. or 4 in. thick, run from the forward to the after barbette with sub-division between the bulkhead and the armour. The ships are said to be crowded internally, and it is asserted that the barbettes weigh 200 tons more than is necessary, but being of the triple type, doubt may be expressed on this point. Delay in construction has been due to the inability of Russian steel works to produce high-tensile steel that will pass the tests, and generally it is asseverated that Russia will pay dearly for her resolution to build the ships in Russia.

Estimates.

The Estimates for 1911 were presented to the Duma on September 24th, the ordinary expenditure being £12,020,550 (an increase of £2,420,000), and the extraordinary charges £1,150,000. The latter were chiefly devoted to expenses still arising from the late war. The principal increase in the ordinary estimates was additional expenditure for new construction, with other additions for the reconstruction and re-armament of vessels and various purposes. The sum set down for the four new battleships was £2,800,000, being an increase of over £1,000,000 upon the demands made last year. At the same time, under the law of July 4, 1910, a sum of £3,130,000 was provided for the equipment of the bases, shipyards, and establishments.

The Duma, though severely critical of the Admiralty, and disappointed at the apparently fruitless character of an inquiry made into its administration, was not adverse to naval expansion, and appears to be willing to regard the four battleships which have been laid down as the first instalment of a fleet intended to consist of 16 ships of the Dreadnought class. Moreover, the Duma has been powerless to exert pressure upon the authorities by refusing money for new construction, because the Council of the Empire, receiving the endorsement of the Tsar, had sanctioned the expenditure which it had struck out from previous Estimates. Accordingly the

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Duma decided to approve the outlay of £2,800,000 upon the four battleships in 1911, making the vote conditional upon £730,000 being expended upon each ship, but on March 23rd the Duma Committee of National Defence reduced the Naval Vote by £250,000 as a demonstration against the Minister of Marine.

Battleships and cruisers.

The battleships Andrei Pervozvannyi and Imperator Pavel I., of the class next preceding the Ganguts, which have undergone satisfactory trials, are to be commissioned this year in the active fleet, as well as the armoured cruisers Pallada and Bayan, which have been built at the Admiralty Yard, St. Petersburg, and, in the Black Sea, the battleship Sviatoi Evstafi. The Andrei Pervozvannyi and Pavel I. belong to the programme of 1903 and 1904, and have been seven years in hand.

The armoured cruiser Gromoboi has undergone satisfactory trials after reconstruction.

The battleship Slava, whose boilers (tried and accepted in the winter of 1909–10) have proved unsatisfactory, requires reconstruction and repair at a cost of about £40,000. This is being done at Toulon, and the circumstance has caused severe comments in the Duma.

Torpedo craft.

Two destroyers of 1320 tons, 35 knots, are building at the Putiloff and Baltic Yards, St. Petersburg, the money having been provided by subscription, which also provides for a submersible of 500 tons. Two submarine flotillas have been formed in the Baltic.

Gunboats.

The gunboats Ardagan and Kars, 630 tons, are completing at the New Admiralty yard, St. Petersburg, for the Caspian flotilla. Two old gunboats, so named, have been removed from the list as well as the Groziastchy and the old cruiser Admiral Korniloff.

The training ships Kreisser, Gertzog Edinburgski and General Admiral have been re-named Volchoff, Onega and Narova.

Bases and defences.

Large sums are being expended on coast defence and other works. The Tsar during his visit to Finnish waters last July inspected the position at Hermanso, which is on the island to the north-east of the Hango Peninsula, and sheltered by it from the winter gales. Here a naval base is to be established, which can be kept open during the winter. Batteries have already been erected on Hermanso and Masking Islands on the Finland side, but the principal anchorage will be between Hermanso and Lappvick, where there is a depth of 35 fathoms. The coast is rocky and dangerous. A coal depôt is intended to be created near Lappvick, which is on the mainland and near the railway, so that a branch will connect it at small cost. A fortress is also proposed on this side opposite to Reval. There seems to be an intention of converting the Gulf of Finland into a Russian lake. The work is beginning this year. There is to be a torpedo

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base at Porkalla, between Helsingfors and Hango, and at Ekenas, on the mainland behind Hermanso, large barracks are to be erected. It is proposed to cut a canal through the Lappvik Isthmus to provide a way into the Baltic at Ekenas. Russian activity in this region is very remarkable, and causes anxiety in Sweden.

Black Sea. The Defence Committee of the Duma found cause for attacking the Admiralty for its assumed failure to devote money which had been voted in 1908 and 1909 to the building of destroyers and submarines in the Black Sea. A report was presented at the end of January pointing out the great dangers that might arise in these waters through the growing strength of Turkey. Admiral Voievodski, Minister of Marine, visited the Black Sea ports in September, not returning until December. He says the building of the newly completed battleships Sviatoi Evstafi and Ioann Zlatoust has been conducted very satisfactorily, and that a third ship of the type is to be completed next year. A writer in the *Fremdenblatt*, of Vienna, attributes the latter statement to the Admiral, and also says that the Minister proposes to build at Sevastopol and Nikolaieff four Dreadnoughts of 23,000 tons, 42,000 H.P., and 23 knots, carrying ten 13-in. 45-calibre Okukhoff guns, as well as twenty 4·7-in. and 20 smaller guns. The same programme is said to include 12 destroyers and 12 large submersibles. In relation to this matter it may be recorded that the *Novoe Vremya* recently said the Minister proposed to enter into a contract covering 15 years with a British firm for the reorganising and supplying with new plant of the dockyard at Nikolaieff. The Duma, in March, 1911, insisted strongly on the appointment of a successor to the present Minister.

United States.

Several various and conflicting currents of opinion are at the present time affecting the expansion of the United States Navy. There was strong opposition in Congress to great naval increase, and the Navy Department was influenced by a situation which was rather political than purely naval. The General Board of the Navy, in recommending a considerable programme—which has not been adopted—took account of the growing responsibilities of the United States. Its report said that it was incumbent to uphold (1) traditional policy of the Monroe doctrine, (2) that of the open door, and (3) the preservation of the neutrality of the Panama Canal. None of these obligations could be maintained without an efficient Battle Fleet. The fact was insisted on that the Battle Fleet, without its scouts, destroyers, repair ship, transports, supply ships, colliers, hospital ships, etc., would not be complete, for it could not keep the sea continuously

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unless it carried its base with it and was accompanied by the "train necessary for this purpose."

The naval programme.

The Navy Department programme was not so extensive. It omitted any mention of destroyers, it being known that these would be inserted by the House of Representatives, mainly on the urgent representation of the Pacific coast representatives, but the Navy was regarded as a whole, with its auxiliaries, whereas the programme actually adopted by the House of Representatives was arrived at chiefly by the elimination of auxiliaries, to which both the Navy Department and the General Board attached importance. The several programmes will be seen from the following statement:—

—	General Board.	Navy Department.	House of Representatives.
Battleships	4	2	2
Destroyers	16	—	8
Submersibles	—	2	4
Scouts	4	—	—
Gunboats	3	1	—
River Gunboats	—	1	—
Fleet Colliers	4	1	2
Repair Ships	1	—	—
Destroyer tenders	2	—	—
Submarine tenders	2	1	—
Seagoing tugs	2	2	—
Mine layers	1	—	—
Transports	2	—	—
Hospital Ships	1	—	—

Future policy.

The opening of the Panama Canal will have a great effect upon the United States Navy, and consequences which cannot exactly be foreseen. Mr. Meyer, Secretary of the Navy, has discussed the matter in relation to what is called the "two-ocean policy" and the distribution of the Fleet, and he strongly insists that it would be impolitic to send a small force to the Pacific. In his Annual Report he said there had been a constant desire on the part of people on the Pacific coast for the maintenance of the Battle Fleet there. During his visit of inspection he heard these views frequently expressed, and endeavoured to make it clear that it was not now considered advisable to maintain the Battle Fleet in the Pacific Ocean. He pointed to the want of docks, and said that, with the difference in the cost of coal, nearly £800,000 a year more would be required to maintain the Fleet in the Pacific. No suitable coal mined on the Pacific coast was yet available, and should the coal be transported entirely in American bottoms, the cost would be increased at least 25 per cent. In addition, the cost of Navy yard repairs and of all supplies on the west coast was greater than on the Atlantic. Therefore, for reasons largely economical, it would be inadvisable to transfer the Fleet to the Pacific, even if there were no

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The Panama Canal.

other reasons; but it is considered that the place for the Fleet, at least until the Panama Canal is completed, is in the Atlantic. "Our responsibilities in regard to the Panama Canal," he said, "will probably properly call for the presence of the Fleet in or near the Caribbean Sea, unless some emergency should arise calling for its presence elsewhere." When the Panama Canal is opened the Fleet will be able to pass from one ocean to the other, and it will then, probably, with the increased facilities of the two Navy yards on the Pacific coast, which are advisable, spend some time in each ocean. Mr. Meyer thinks it should be practicable for the Fleet to make cruises at different times, somewhat after the principle of the battleship cruise around the world, and the Pacific Ocean, he says, is well adapted for exercises of that character.

Fleet organisation.

In relation to these changes it is hoped shortly to organise the Fleet with five battleships in each division, the four divisions being apportioned to New York, Norfolk, Philadelphia, and Boston. Under these arrangements all ships could dock at their home yards twice a year, and one ship be absent at a time when required. If it is possible to make the ships less dependent on the yards by introducing repair ships, the results will be still more satisfactory. Practically no ship would be out of commission or in reserve, and ships in the yard would have about half complements, and could go to sea at 24 hours' notice.

Peace and war preparation.

Mr. Meyer met the opposition of those who were moved by a love of peace to deprecate preparation for war by a forcible statement, from which the following passage is extracted:—

> All nations are in accord in expressing a desire for peace. The question has even been agitated that there should be an international court of arbitration or supreme court for the adjudication of international affairs. Unfortunately, we are in all probability somewhat distant from any such arrangement, but even if that should come the court's decrees would be of no avail, unless they could be carried out; and under the most favourable circumstances it will be necessary for at least five or six of the nations to maintain navies, which will be able to enforce the decrees of the international court against any single nation that might object to its decisions. Notwithstanding the improbability of war, and the reliance placed on the nation's isolation and resources, history and experience teach us that circumstances may arise at any time which might involve us in war, unless we are sufficiently prepared to prevent it. The delusion that a nation with a large population, great wealth, and resources is immune from attack has been dispelled by the history of war. Every nation which is forced to play an important part in the affairs of the world, or is desirous of protecting her own interests, must be always prepared to defend her interests at home and the investment of her capital abroad. Experience has shown the wisdom of systematic preparation for war. If we wait until a crisis comes, it is then too late to make effective preparations, and the result is confusion, waste, and unnecessary loss of life. In any war involving the United States, the control of the sea will be of the utmost and deciding importance. Such control can be obtained only by an efficient Navy of sufficient strength.

A suggested extended programme.

In view of this opinion it is not surprising to find that the Naval Secretary favours an extended shipbuilding programme covering several years. His idea is that there should be two "lines" of the

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Fleet—the first with a limit of age for battleships of ten years, and the second of 20 years. He says it is very important that construction and reconstruction should proceed regularly in the matter of building and obsolescence. At the rate of two battleships a year the strength will fall in 1916 to 17 ships, and the standard of 20 ships in the first line will not again be attained until 1920. This would result from the relegation of ships more than ten years old to the second line. If the standard of 20 ships is to be maintained on this basis, additional ships will have to be laid down during the next two years. The four-battleship programme of the General Board was intended to provide for replacing battleships which will be 20 years old in 1914, with four destroyers for each battleship, and necessary scouts.

The following is a list of the battleships in hand:— Battleships.

——	Programme.	Builder.	Laid down.	Launched.	For completion.
Florida . . .	1908-9	N.Y. Navy Yard .	9/3/1909	12/5/1910	9/6/1911
Utah . . .	1908-9	N.Y. Shipbldg. Co.	15/3/1909	23/12/1909	24/7/1911
Arkansas . .	1909-10	N.Y. Shipbldg. Co.	25/1/1910	14/1/1911	1912
Wyoming . .	1909-10	Cramp	9/2/1910	..	1912
New York . .	1910-11	N.Y. Shipbldg. Co.	..	..	1913
Texas . . .	1910-11	Newport News Co.	..	..	1913
A.	1911-12	..	..	..	1914
B.	1911-12	..	..	..	1914

The Florida and Utah, as well as the Arkansas and Wyoming, were described in the *Naval Annual* last year. It is officially stated that the two vessels first named will be delayed, owing to changes introduced since the keels were laid and to failure to deliver turbine casings in time. The report of the Chief Constructor, however, testifies to a general increase of rapidity in construction having been attained during recent years. The slow delivery of turbine casings was due to the Navy Department having decided to have the work done at the Navy yard, where the cost is considerably greater. The House Committee reluctantly consented to insert a provision whereby the limit of cost of the Florida, exclusive of armour and armament, should be increased from £1,200,000 to £1,280,000. Without this provision the Navy yard could not build the battleship within the limit set by law. Moreover, owing to the extra expenditure on the Florida, and the great increase in the estimated cost of the New York, authorised last year to be built in a Navy yard, the Committee inserted a provision repealing the provision in the Act which authorised the building of the ship in a Navy yard. The contract for the sister ship, Texas, had been let by contract to the Newport News

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Company for £1,166,000, exclusive of armour and armament, while the estimates for building the same ship in the Navy yard exceeded the limit of cost (£1,200,000) for hull and machinery by £300,000. Both these ships are directed to be built under the restriction of the eight hours' law.

Turbines or reciprocating engines?

A great argument has arisen with regard to the machinery of the ships of last year's programme. The Chief Constructor and the Engineer-in-Chief favoured a return to reciprocating engines, while the General Board inclined towards the turbine. Economy was said to be indisputably on the side of the reciprocating type, while practical advantages were with the turbine. Increased cost of turbine working was alleged to have been shown in the comparative cruising of the scouts, and to be confirmed by the performances of the Delaware and North Dakota on the trip of the Atlantic Fleet to European waters. The Texas and New York, owing to uncertainty on this and other matters, are five months behind the ships previously authorised, whereby the Secretary was able to show an apparent saving. An effort was made to get the question reconsidered, so far, at least, as the New York was concerned. But the Bureau of Steam Engineering desired that both ships should be identical, and, as a reconsideration would be expensive in the case of the Texas, owing to arrangements having been definitely made, it is probable that both ships will have reciprocating engines. There are many officers who regard the step proposed as retrograde.

Battleships of 1910–11.

No precise description has been given of the New York and Texas, but the following particulars are presumably accurate:— Displacement, 27,000 tons; armament, eight or ten 14-in., in barbettes on the middle line, twenty-two 5-in. (of which eight in the central redoubt), two submerged torpedo tubes; side and barbette armour, 11 in. to 9 in. and 5 in. at the ends; engines, 35,000 I.H.P.; speed, 21 knots.

Battleships of 1911–12.

With regard to the two battleships of 1911–12 it is known that the Navy Department has plans ready for a ship approaching 30,000 tons displacement. Questions which have been addressed to the Navy yards and the bureaus suggest that the new ships will be of a remarkable type. A proposal for a 16-in. gun was put forward, but was rejected, and it is believed that the design will provide for twelve 14-in. guns, mounted in threes in barbettes on the middle line. For some time the Bureau of Ordnance has had the system of triple turrets under consideration. With regard to the machinery, as modifications in the turbine are under consideration, and are shortly to be tested, it does not follow that the intended new ships will have reciprocating engines. It is stated to be fairly well

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settled that no coal will be carried, and that the ships will be fitted entirely for oil burning. A serious fire took place in the North Dakota, the first American battleship in which oil-fuel was installed, and the designers had little to guide them.

Destroyers.

The late Mr. Pitman Pulsifer, in his semi-official "Navy Year Book," pointed out that the destroyer, which was first authorised in 1898, had advanced since then from 420 to 720 tons or more. It is probable that the eight destroyers of 1911–12 will be bigger. Upon this point the *Army and Navy Register* made the following comment:—

> It is contemplated to build destroyers with a displacement of about 1000 tons as against about 750 tons, the increase to be utilised in furnishing motive power capable of driving the boats at an average speed of 30 knots. This is a development of the destroyer which practically approaches the scout class and represents the extinction of the scout as an independent type. Under such circumstances, it is extremely doubtful whether there will be built any more vessels of the Chester class, since the tendency is to increase the size of the destroyer into an effective substitute.

Of the 742-ton class the Paulding, Drayton, Roe, Terry, Perkins, Sterrett, McCall, Burrows, and some others have been delivered. Success appears to have attended the trials of all the new destroyers. The Warrington and Mayrant (Zoelly) and the Patterson (Parsons) have been built at Messrs. Cramp's yard, Philadelphia, and all three have White-Forster boilers, 12,000 I.H.P. The McCall, on December 10th, made 33·04 knots over the measured mile on the government range, Delaware Bay. The vessel is one of the new oil-burning craft, using the Koerting system of oil firing. She made a 12-hours' endurance run on December 8th, and a four-hours' test at 30 knots an hour on December 9th. At her builder's trial she made 32·56 knots. The contract is 29·5 knots.

Submarines and sub-surface boats.

The submarine Seal was launched in February at Newport News. She is the first of the Lake type to be constructed for the United States Navy—525 tons submerged, 160 ft. long, 13 ft. beam, speed, 14 knots (surface), 9½ knots (submerged), 6 tubes, storage for 10 torpedoes, economical speed range about 2500 miles. No further particulars are available concerning the new submarines. One of the three sub-surface destroyers has been under trial successfully. There is a submarine hull containing an eight-cylinder gasolene engine of 150 H.P. and torpedo armament, suspended for an unsinkable surface hull divided into compartments which are packed with cellulose. The speed was 18 knots, while the expectation was but 16, and the range was 200 miles. The Commander is in an armoured conning tower in the upper hull, directing the boat's operations, and only two men are required. It is said that 50 such boats can be built for the cost of two or three destroyers or submarines.

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Reorganization of the Navy Department.

An account of the reorganization of the Navy Department was given in the *Naval Annual* last year, and the following extract from the Report of the Secretary explains the satisfactory results :—

The Aid for Operations, Rear-Admiral Wainwright, has worked out a reorganization of the battleship fleet and the torpedo vessels which has brought about markedly greater efficiency. It has also produced a more even amount of repair work at Navy yards. The work of the General Board, War College, and Office of Naval Intelligence has been better co-ordinated, so that our war plans and strategic studies are up to date.

The Aid for Material, Captain Fletcher, has been of most assistance and value in scrutinising requests for repairs on vessels with a view to determining whether the final military value will justify the expenditure. Where such repairs are of an extended nature, the subject is taken up with the General Board and the Division of Inspections to determine the necessity or advisability from a military point of view. There can be no doubt that this method is preventing useless and unwarranted expenditures which have been made in the past.

As an illustration of how business has been expedited under the present organization, the following is interesting:—The design of new ships has been a fruitful source of dissension in the past, often resulting in long delays amounting to a year or more before final plans were approved or the actual work of construction begun. In the case of battleships Nos. 34 and 35 (New York and Texas), appropriated for by the present Congress last June, preliminary designs were presented for the department's consideration by the Bureau of Construction and Repair on April 18, 1910. The General Board, strengthened by military critics called from the battleship fleet, and other specialists, subjected these plans to critical discussion, thus giving seagoing officers ample opportunity to present the result of their knowledge and seagoing experience. The plans, with this comment and criticism, were sent back to the department on May 25. These criticisms were referred to the technical bureaus concerned. The diverging opinions were reconciled, and the final corrected plan received the Secretary's approval June 10, 1910. The differences of opinion upon these plans that existed between the various authorities, both technical and military, were never before so quickly and satisfactorily adjusted, and the department had the satisfaction of approving the final plans of two great battleships in record time and nearly two weeks before the appropriation for their construction became available.

The Aid for Inspection, Admiral Ward, has been of material assistance in expediting the necessary repair work on ships and in advising what older vessels should not be further repaired, and also in overcoming the tendency to spend too much money in modernising vessels of little military value.

The duties of the Aid for *Personnel*, Rear-Admiral Potter, consisted in recommendations on the subject of details of officers of the higher grades, matters concerning the enlisted men of the Navy, those affecting the Naval Academy, matters of discipline and legislation affecting the *personnel*, and of matters pertaining to the naval militia.

SECONDARY NAVIES.

ARGENTINA.

New battleships.

IN the *Naval Annual* last year the characteristics of the battleships Moreno and Rivadavia were given from the best sources of information available at the time, and chiefly from details supplied by those actually engaged in the work of designing. Further progress has led to a revision of some of the details, and the description which follows is from information recently received. We are indebted to official sources for some of the particulars, while others are taken from the *Nacion*, of Buenos Ayres. The revised figures for the displacement show 27,600 tons as the normal and 30,200 tons

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as full load displacement. The length will be 585 ft.; beam, 98 ft.; normal draught, 27 ft. 6 in. The main armament will consist of twelve 12-in. 50-calibre guns, mounted in six barbettes, of which four are on the middle line and one on either beam, these being échelonned, with the starboard barbette furthest towards the bow. In the forward pair of the barbettes on the centre line, 25 ft. above the water-line, the aftermost fires over the other, and, the same arrangement reversed applies to the after pair, which will be 17 ft. above the water. The starboard barbette, 22 ft. above the normal water-line, fires 60 degrees forward of the beam and 40 degrees abaft, and the port barbette 60 degrees abaft the beam and 40 degrees forward. The guns will be supplied by the Bethlehem Steel Company, and the following are the particulars:—

Calibre	12 in.	6 in.	4 in.
Weight of projectile	867 lb.	105 lb.	33 lb.
Initial velocity	3,000 ft.	3,000 ft.	3,000 ft.
Muzzle energy	16,890 tons	2,028 tons	640 tons
Rounds per minute	2	6 to 8	12

The twelve 6-in. guns are in the central citadel, and the sixteen 4-in. on the top of the four central barbettes and at the sides of the bridge. Protection will be given by a 12-in. belt, 200 ft. long, rising 4 ft. 9 in. above and descending 3 ft. 4 in. below the normal water-line. Reduced to 10 in. this belt will extend 75 ft. further at both ends till it comes abreast of the extreme barbettes, thus constituting, with transverse armour, the central citadel. Forward 6 in. and abaft 4 in. of armour will extend to the ends. Above the main belt, for a length of 400 ft., will be 9-in. armour, reducing to 8 in. at the level of the upper deck. A still higher range of 6-in. armour will protect the 6-in. guns. The 12-in. guns will have 12-in. armour in front, 9-in. at the sides, 11-in. at the back, and 3-in. above. For the protection of the funnels they will have 1½-in. nickel steel covering them to a height of 15 ft. above the upper deck. The total weight of armour, barbettes, etc., will be about 7000 tons. Under-water protection accounts for 600 tons of nickel steel for an inner bottom and two longitudinal bulkheads. The motive power will be supplied by three Curtis turbines (39,500 H.P.), and 18 Babcock and Wilcox boilers; 22½ knots. Fuel capacity will be 4000 tons coal (maximum) and 600 tons oil; the range at 11 knots, 10,000 miles. There will be two 21-in. submerged torpedo tubes. The complement will be 46 officers and 1000 men.

The cost of each ship is stated to be £2,200,000, and they are to be delivered in from 24 to 27 months. It is said that the price of the different contractors worked out as follows, per ton:—American, £78·3; Italian, £85·9; British, £86·3; French, £87·4; German,

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£88·2. Captain Capeola, secretary of the Argentine Naval Commission, is reported to have said: "The reason why the United States tender was lower than the English is that steel for construction work and armour plating is a great deal cheaper in the United States than in England; wages are higher there, but the contractors will save a considerable amount on the steel, and are able to obtain it more cheaply owing to the manipulations of the Steel Trust."

Destroyers.

Particulars were given last year of the contracts for the twelve 890-ton to 950-ton turbine 32-knot destroyers, with oil fuel stoking. They have been named as follows:—Cammell Laird and Co.—the San Luis, Santa Fé, Santiago, Tucuman; Germania, Kiel—the Catamarca and Jujuy; Schichau, Danzig—the Cordoba and La Plata; De la Brosse and Fouché, Nantes—the Mendoza, Rioja, Salta, and San Juan. The Cordoba was the first of the series to be launched.

Brazil.

Mutiny at Rio de Janeiro.

The most remarkable fact to be recorded concerning the Brazilian Navy since the last volume of the *Naval Annual* was issued is the mutiny which occurred at Rio de Janeiro on the night of November 22–23, when the captain of the Minas Geraes and several other officers were murdered, others sent ashore, and a short bombardment of the town and fortifications took place. The ships' companies implicated were those of the Minas Geraes, São Paulo, Marshal Floriano, and Bahia. What political purpose underlay the rising is not well known, but the ostensible object was to demand better treatment and better food. The worst feature was that the mutineers only expressed regret when an amnesty had been promised to them. There was a mutinous rising in the Rio Grande do Sul on December 10, but it was severely repressed. These events suggest the reflection that great armaments are valueless to a State unless that State possesses also trained and disciplined officers and men.

São Paulo trials.

A full account of the new battleships and of the trials of the Minas Geraes appeared in the *Naval Annual* last year. That ship was built at Elswick. The trials of the São Paulo, built at Barrow, were equally successful, and the following is a summary of the results:—

—	Speed.	Indicated Horse-Power.	Revolutions.
	knots.		
48-hours' 10 knots coal-consumption trial . .	10·61	2,383	67·5
30-hours' trial, 75 per cent. of full power. . .	19·85	17,337	—
8-hours' natural-draught trial	20·99	22,355	—
Full-power forced-draught trial at 250-lb. pressure, mean of six-mile runs	21·23	25,517	—
Forced-draught trial at 280-lb. pressure . . .	21·62	28,645	150·8

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The 48 hours' trial gives a range of over 12,900 nautical miles, while the guarantee was 10,000. In the 8-hours' trial limits were placed on boiler and engines for a speed of 20 knots under easy steam, and practically the guaranteed speed of 21 knots was attained. The coal consumption was only 1·42 lb. per H.P. The trials concluded with circling and manœuvring tests, and the gun-mounting trials were carried out successfully, a feature being the firing of ten 12-in. guns simultaneously.

A third Brazilian battleship, the Rio de Janeiro, is in hand at Messrs. Armstrong, Whitworth's, Elswick, the turbine machinery being supplied by Messrs. Vickers. The following particulars have been published, but are not guaranteed:—32,000 tons; length over all, 655 ft.; beam, 92 ft.; mean draught, 26 ft.; armament, twelve 14-in., fourteen 6-in., fourteen 4-in. guns, twelve light guns, three 18-in. submerged torpedo tubes; speed, 22½ knots; approximate cost, £2,900,000.

Scouts.

The scouts Bahia and Rio Grande do Sul were very successful in their trials. Bahia: 10·38 knots, with 170 revolutions, on the 10 knots 24 hours' trial; 24 knots, 436 revolutions, on the six hours' three-quarter power trial; 27·01 knots, 496 revolutions, on the full-power trial. Rio Grande do Sul: 10·7 knots, 175 revolutions (10 knots, 24 hours); 24 knots, 447 revolutions (6 hours, three-quarter power); 27·41 knots, 507 revolutions (full power). Another scout of the class, named Ceara, is in hand.

Destroyers.

The whole of the ten destroyers built by Messrs. Yarrow at Scotstoun are completed, and have gone through most successful trials. The last of the series, Sergipe, left Scotstoun, Oct. 24. The trial speeds ranged from 27·16 knots in the Matto Grosso to 28·74 knots in the Parana. It would have been easy to run the boats at 29 knots or more, but the object of the builders and the Brazilian authorities was to attain a high speed which could be maintained on service, and similar speeds have since been attained with Brazilian crews. The turning circle at full speed is 375 yards, and at two-thirds speed 330 yards. In the starting and stopping trials, the boats began to move astern from full speed ahead in 30 seconds from the signal by telegraph, and ahead from full speed astern in 25 seconds. The coal capacity is 140 tons, and the range at 14 knots about 3400 miles.

Submarines.

It is proposed to build three large submarines, as well as a mine-layer and several river gunboats.

Floating dock.

The floating dock Affonso Penna, which is 550 ft. 6 in. long and 136 ft. wide, and has a lifting capacity of 30,000 tons, built by Messrs. Vickers at Barrow, has reached Brazil. The dock is in three

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compartments, all flooded and emptied from a single control house, and the valves are operated by the Westinghouse electro-pneumatic apparatus, while indicators show the depth of flotation. Steam capstans, pumping engines, boilers, engines, dynamos, distilling plant, and all that can be required for operating the dock, working on the ship in the dark, and the requirements of officers and men has been supplied. This dock resembles those now being constructed for the British Navy, and appears to be on the same principle as the great dock at Messrs. Blohm and Voss's, Hamburg, and one which the Howaldt Company at Kiel are constructing for the German Navy.

Bulgaria.

Since the return of the French officers who reorganized the Navy, there has been a reduction of the *personnel* serving afloat, the whole of the vessels, except the Nadiezda, six destroyers and the yacht Krum, having only nucleus crews. Some of the vessels are to be reconstructed. The despatch vessels Kamtshija and Striela have been bought for the customs service.

Chile.

The Senate authorised the naval authorities on June 30 to obtain tenders for a battleship of over 20,000 tons, six destroyers, and two submarines. In January, it was stated from Santiago that tenders were to be opened in April, in London and Washington, for two battleships, but the tenders have been much delayed, and now it is known that the ships will not be built to the original designs, and that much more elaborate tenders have been requested. The original design was of 24,000 tons, and resembled that of the British Neptune. Tenders were delivered in London for six destroyers of 1500 tons in January, but the prospective builders were asked to tender for three or six ships to be built in this country, or alternatively for the three to be re-erected in South America.

Two floating docks for destroyers and small vessels are to be built.

China.

The Chinese proposals for building a modern Fleet seem gradually to be taking practical shape. Nothing is known of the projected three battleships, but small cruisers and gunboats are making progress. Two protected cruisers, of 2460 tons, 330 ft. long, 39 ft. 6 in. beam, and 13 ft. draught, are building respectively at Elswick and Barrow. Armament: two 6-in., four 4-in., two 3-in., six 3-pdr., two 1¼-pdr.,

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two 18-in. deck torpedo tubes; deck protection, ¾-in. They are to have Parsons turbines of 6000 S.H.P., to give a speed of 20 knots. The cruiser at Barrow will have engines and boilers by Messrs. Vickers, the latter having single-ended cylindrical and White-Forster water-tube. Coal capacity, 225–600 tons; complement, 270. The scheme includes a third of the class. The Germania Yard at Kiel is building a river gunboat of 138 tons, carrying a 4·7-in. Q.F. Howitzer, four 2·1-in. Q.F., and four machine guns. At the Kawasaki Yard, Kobe, the Kiang Heng, Jsu Jang, and other gunboats have been built; these are two-funnelled vessels. The programme includes eight gunboats and destroyers.

Cuba.

Some small armoured cruisers are to be built in England for the Cuban Government, and Messrs. Cramp have in hand at Philadelphia the cruiser Cuba, 2055 tons, 3500 H.P. (reciprocating engines), 18 knots, and the gunboat Patria, 1200 tons, 1500 H.P., 16 knots.

Denmark.

Six 27-knot turbine destroyers of 230 tons were ordered last year —the Flyvesfisken at the Schichau Yard, Elbing; the Söridderen at Messrs. Yarrow's, Scotstoun; the Söulven and Spaekhuggeren at the Copenhagen Dockyard; and the Tumleren and Vindhunden at Messrs. Burmeister and Wain's, Copenhagen. The Söridderen, which was launched February 28, has Yarrow water-tube boilers and Brown-Curtis turbines of about 4000 S.H.P., for a designed speed of 27 knots. The Whitehead Company are building two submarines, one at Fiume and the other at the Copenhagen Dockyard.

Ecuador.

The torpedo cruiser Almirante Simpson, 812 tons, built at Birkenhead, 1896, is said to have been purchased from Chile.

Greece.

The armoured cruiser Giorgios Averoff, 9956 tons, purchased from Messrs. Orlando, of Leghorn, and described in the *Naval Annual* last year, has been completed. With the exception of some internal details, and the masting, which gives the cruiser two tripods, she closely resembles the Italian Pisa, built by Messrs. Orlando, and Amalfi, by Messrs. Odero, both designed by Comm. G. Orlando. The first trials, at one-tenth power, were successful, giving coal consumption of 627 grammes, equal to a range of 9000 miles with 1600 tons. Natural draught trials, 14,200 H.P., 20·7 knots. Some destroyers are projected.

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Netherlands.

The Dutch Navy Estimates for 1911 amounted to a total of £1,430,188, exclusive of pilot, lighthouse, and other charges, which fall upon the Naval Department. The sums were as follows:—Administration, £37,225; *matériel*, £669,039; *personnel*, £474,588; hydrography, £1579; pensions, £247,757. The increase upon the previous year was £149,759. The following were the votes for new construction:—Second instalments for the third submarine and the two mine layers; first instalments for two additional submarines; a grant for the building of a mother ship for submarines; first instalment for the building of three armoured gunboats; and for the Indian Marine, second instalment for the destroyers sanctioned in 1910, and the first instalment for four additional destroyers.

The armoured gunboats will be of a new class, and take the place in the programme of the deck-protected vessels, of which 16 were to have been built. They are for use in shallow waters for dealing with an enemy's destroyers, and will carry four semi-automatic 4-in. guns and two machine guns. They will displace 520 tons, and will have belts of 2½-in. steel and ¾-in. decks, while the conning-tower and ammunition hoists will have 2-in. protection. Their oil motors will have a designed speed of 15 knots, which scarcely seems adequate for the purpose indicated. The total cost of each boat will be about £48,000. It is intended to create a flotilla, and as the boats will work in pairs, only half of them will have wireless apparatus.

The two mine-layers are of 670 tons and ten knots speed, and will carry three 12-pdrs.

The small battleship De Zeven Provinicien, 6525 tons, has been completed.

Two of the destroyers (460 tons) have been named Wolf and Fret. They are turbine boats, intended for a speed of 30 knots, carry four 12-pdrs. and four machine guns, and have two torpedo tubes. They have been built at the Schelde Yard, Flushing, on account and under the supervision of Messrs. Yarrow, of Scotstoun, and were launched severally on September 16 and October 15. The Wolf easily obtained 30·47 knots on a three hours' run, being well in excess of the contract.

The first submarine boat, called Luctor et Emergo (120 tons), is now designated No. 1. Nos. 2 and 3 (150 tons) are in hand at the Schelde Yard, and another, of 380 tons, 151 ft. 6 in. long, with a surface speed of 16 knots and submerged of 11 knots, is being built by Messrs. Whitehead, at Fiume. She is for colonial employment, and will have special adaptations for tropical service.

On July 1 the *personnel* will number 11,338.

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Norway.

The Estimates as accepted by the Storthing for the year ending June 30, 1911, amounted to £303,352, thus to be expended: Pay, £111,328; training, £15,232; ships in commission, trials and exercises, £40,880; *matériel*, £135,912. The Minister stated that the programme of the former Government was inadequate, and that he would prepare a new one next year, until which time he could say nothing about new construction.

A torpedo-boat of the Skarv type, 100 tons, is in hand. The submarine Kobben, built at the Germania Yard, has arrived at Christiania. A second of the class is to be built.

Portugal.

The Portuguese Navy has now the unenviable fame of having taken a leading, if not the chief, part in the overthrow of the Portuguese monarchy in the revolution of October last. The *Times* correspondent, reviewing the situation six months after the event, said that the Navy—and the Army also—were undoubtedly honeycombed with the principles of Socialism—filled, rank and file, with the windy orator's doctrines and a very real sense of their own power, taught by the politicians that they were "free men and not automata." "It is notorious that in many regiments and in many ships the controlling authority, such as it is, rests with the non-commissioned officers, who, either as Carbonarios or as Freemasons, or both, conspired for the making of the Revolution." The vessels which were most active in the events of last October were the Dom Carlos I., the São Rafael and Adamastor, and some of the older gunboats were in sympathy. There was a mutiny in the Marine barracks at Alcantara, where the Republican flag was hoisted, and when at one time it seemed as if the Royalist troops would gain the day, strenuous exhortations came from the rebel ships urging the insurgent troops to hold their positions, and the ultimate issue lay with the Dom Carlos and the São Rafael, whose guns shelled the Royalist position from the water.

Such being the state of affairs it is difficult to look for any practical work with the Navy, and a story circulated to the effect that a commission appointed by the Minister of Marine had "decided upon the immediate acquisition from Great Britain of three battleships of the Dreadnought type" was absurd. The programme of the Royal Government was two capital ships for future construction, six protected cruisers of 5000 tons, 18 destroyers of 400 tons, and six submersibles of 320 tons submerged. It is possible that some of these may be constructed by the Republican Government, which has been

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credited with such an intention. Messrs. Orlando have in hand at Leghorn a submersible in every way similar to those the same firm are building for the Italian Navy. Before the revolution a destroyer was proposed to be constructed at Lisbon, designed to have Yarrow boilers and machinery from Scotstoun; and the firm have received an order for the complete boiler and machinery installation, and are preparing designs for the hull. The turbines will be of Parsons type. Messrs. Yarrow have also completed, at Scotstoun, a small gunboat of 107 tons, named Macao. The old gunboat Liberal was lost at Ambriz after running on a rock on June 22. The gunboat Tejo also ran on the rocks near the Berlenga Islands. In neither of these mishaps was there any loss of life.

SPAIN.

The details of the programme and the characteristics of the new vessels were given in the *Naval Annual* last year. Satisfactory progress is being made with the work of construction. The battleships España and Alfonso XIII. are both making progress at Ferrol, and the Jaime I. el Conquistador is expected to be laid down before the end of the year. Of the four gunboats, the Recalde has been launched at Cartagena, where the others are building. The three destroyers and several of the 24 torpedo boats have been ordered.

The harbour and dockyard at Ferrol are being made equal to the requirements of the new fleet. By dredging and blasting the basin will be given a depth of 28 ft. at low water. The new turbine shop is already at work with the Parsons turbines for the destroyers, and various other shops are nearing completion. The dry dock is being enlarged to a length of 604 ft., with 28 ft. over the sill at low water, 40 ft. depth, and width at entrance of 102 ft.

SWEDEN.

As was stated last year, there exists a scheme for the building of four small battleships, but nothing has been done towards the execution of it. The design shows a displacement of 6800 tons, an armament of four 11-in. and eight 6-in. guns, a complete armour belt, with a maximum thickness of 8 in., and a speed of 22½ knots. Four additional destroyers are also proposed. A Special Committee on National Defence has examined the whole scheme relating to land and sea defence, and though the Government considers the general plan to require more consideration, it has strongly pressed for the construction of the first of the battleships, and has asked for a grant of £666,000, to be spread over three years, for the purpose. This was opposed by a strong party, as committing the kingdom to the building

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of the whole four ships, and endangering social reform, and as a result the matter was referred to a committee.

The 30-knot 430-ton destroyer Munin has been launched at the Kokum Yard, Malmö. She is to have A. E. G. turbines, as also her sister, the Hugin, which is in course of construction. At Stockholm a sister boat of the submarine Hvalen is being built, and two others are projected.

The Defence scheme includes further fortifications for Stockholm, to give freedom to the Fleet. The plan includes the completion of the Vasholm and Oskar-Fredericksborg forts and additional defences on the Baltic front. New defences are also proposed at Karlskrona, Aelfsborg, and Horningsholm.

TURKEY.

The Ottoman Navy has grown rapidly by the purchase of vessels from Germany. The sister battleships Kurfürst Friedrich Wilhelm (9901 tons, launched at Wilhelmshaven, 1891), and Weissenburg (launched in the same year at the Vulcan Yard, Stettin), which were just reaching the age for supersession under the German Navy Law, were sold to Turkey in August for £900,000. They have been renamed severally Kheyr-ed-Din Barbarossa, after the famous corsair king who was the antagonist of Andrea Doria, and Turgut (Dragut) Reis, after Barbarossa's most celebrated successor. The four 620-ton 35-knot destroyers bought from Schichau, Nos. S 165–168, went to the Golden Horn, and are named Jadighiar-i-Millet, Muavenet-i-Millet, Mahabet-i-Watan, and Nuhum-i-Hamijet. The cost of these destroyers, which was upwards of £450,000, was paid out of the funds at the disposal of the Fleet Committee. More recently, in February, the Darmstadt and Oldenburg (gross tonnage, about 5000) and the Roland (gross tonnage, 3600) have been purchased from the North German Lloyd, from which some officers have temporarily joined the Turkish Service. The two first-named have a mean speed of about 13 knots and the other of 11½ knots. They are intended for the transport service.

The programme prepared by Sir Douglas Gamble proposed the building of two capital ships, three cruisers, and ten destroyers. The Turkish Ministry of Marine have placed orders with the Armstrong-Vickers group for the construction of two cruiser-battleships—one to be built at Elswick, the other at Barrow. The cost of hull and machinery for each vessel will be about £800,000. Messrs. Armstrong have shipped guns, gun-mountings, and ammunition for the modernisation of the cruiser Abdul Hamid and the Imperial yacht Erthogrool.

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URUGUAY.

The torpedo cruiser Uruguay has been completed at the Vulcan Yard, Stettin. Displacement, 1100 tons; length, 275 ft. 8 in.; beam, 39 ft. 9 in.; armament (Skoda), two 4·7-in., four 12-pdrs., 12 machine guns, two 18-in. torpedo tubes; 5700 H.P.; speed, 23 knots; coal capacity, 210 tons; range, 3000 miles.

The purchase of three destroyers and six torpedo boats is proposed.

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CHAPTER III.

COMPARATIVE STRENGTH.

Additions in 1910-11.

THE additions to the principal navies during the year have been few, though several battleships should be completed early in the year 1911–12. For the British Navy only one battleship and one cruiser battleship have been completed, while five battleships and one cruiser battleship have been launched. For the German Navy two battleships and one cruiser battleship have been completed, while two battleships and two cruiser battleships have been launched. For the United States Navy two battleships have been launched. Of the other navies included in the tables, one battleship has been launched for Italy, one battleship and one armoured cruiser have been completed for Japan, and one battleship launched. In France the anticipations of last year have not been realised. Four only of the Danton class have commenced their trials, while one armoured cruiser has been completed. In Russia, of the four battleships laid down in 1906–7, one may be reckoned as completed, while little, if any, progress has been made with the four battleships laid down in 1909. In Austria two battleships have been completed, and two have been laid down. The Austrian is thus the only navy which has substantially improved its relative position in the year under review. For Brazil, a second Dreadnought battleship has been completed, while Chili has entered the lists by authorising tenders for two 20,000-ton battleships.

Ships in commission.

The number of battleships in full commission for the British and German Navies remains the same as last year.

Great Britain.

By the addition of the Neptune, the First Division of the Home Fleet will shortly consist of eight ships of the Dreadnought era, while the two Lord Nelsons will pass to the Second Division. There will be some delay, however, in making this change, owing to the unfortunate accident to the Collingwood in entering Ferrol harbour, and the refit of the Dreadnought, which is to be completed in time for the Coronation Review. The addition of the Indefatigable will again bring up the strength of the First Cruiser Squadron to five armoured cruisers. Similarly, the five Destroyer Flotillas have been

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strengthened by the inclusion of the newly-completed destroyers of the latest design.

The Third Division of the Home Fleet comprises eleven battleships (viz., the Africa, Bulwark, Albemarle, and eight Majestic class), eight first-class cruisers, two second-class cruisers, and seven third-class cruisers, besides torpedo gunboats, and the cruisers of the Destroyer Flotillas. The Fourth Division of the Home Fleet includes seven battleships, viz., five Canopus class, the Majestic, and the Commonwealth (temporarily), besides the Royal Sovereigns which are to be struck off the list this year, five first-class cruisers, seven second-class cruisers, and three third-class cruisers.

Germany. In the German High Sea Fleet, the Posen and Rheinland have displaced the Zähringen and Wittelsbach, the First Squadron thus consisting of four Nassaus, two Deutschlands, and two of the Wittelsbach type. The Second Squadron consists of three Deutschlands and five Braunschweigs.

The Cruiser Squadron, divided into two groups, consists of three armoured cruisers and six third-class cruisers.

The Reserve Squadron is much the same as last year, and consists of four Kaiser class and two Wörth class.

France. The Battleship Squadrons remain the same as last year. A new feature in the organisation of French squadrons is the proposed formation of two reserve divisions of cruisers, which are only to include ships ready to go to sea. The Toulon division will include the armoured cruisers Victor Hugo, Jules Michelet, and Jules Ferry (when relieved by the Waldeck Rousseau), and the cruisers Chateaurenault and Jurien de la Gravière. The Brest division is to consist of the armoured cruisers Dupetit Thouars, Gueydon, Montcalm, Jeanne d'Arc, and Kléber, and the cruiser Guichen.

Italy. The Italian Fleet in commission has been organised into a Battleship Squadron of six battleships, four of the Vittorio Emanuele III. type and two of the Benedetto Brin type, and into a Cruiser Squadron of seven armoured cruisers, with four scouts and four destroyers.

In the Reserve Division are included five battleships and three armoured cruisers.

Russia. In the Russian Fleet the battleship Slava and the armoured cruiser Rossia are no longer in commission in the Baltic. The Aurora has taken the place of the Oleg in the Mediterranean.

Austria. The Austrians have now in full commission five battleships, viz.: three of the Erzherzog class and two of the Radetzky class. In reserve for most of the year, and in full commission for the summer months, attached to the Active Squadron, there are the three small

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Class.	GREAT BRITAIN. Mediterranean.	Atlantic Fleet.	Home Fleet. 1st Division.	Home Fleet. 2nd Division.	GERMANY. High Sea Fleet.	FRANCE. 1st Squadron.	FRANCE. 2nd Squadron.
Battleships	Cornwallis Duncan Exmouth Russell Swiftsure Triumph	Queen Prince of Wales Formidable Implacable Venerable London	Neptune Dreadnought* Bellerophon Superb Temeraire Collingwood St. Vincent Vanguard Agamemnon‡	Lord Nelson Edward VII. Britannia Dominion Hibernia Hindustan New Zealand	1st Squadron. Westfalen Nassau Posen Rheinland Hannover Schlesien Mecklenburg Wettin 2nd Squadron. Schleswig Holstein Elsass Hessen Preussen Lothringen Deutschland Pommern Braunschweig	1st Division. Patrie République Démocratie 2nd Division. Justice Liberté Vérité Suffren Henry IV. (Bizerta)	1st Division. Charlemagne Gaulois St. Louis 2nd Division. Bouvet Carnot Charles Martel Jauréguiberry
Cruisers 1st Class	6th Squadron. Bacchante Aboukir Lancaster Suffolk	5th Squadron. Good Hope Black Prince D. of Edinburgh Argyll	1st Squadron. Indefatigable Indomitable Inflexible Invincible Defence	2nd Squadron. Shannon Achilles Cochrane Natal Warrior	Von der Tann§ Blucher Roon Yorck	Edgar Quinet Jules Ferry Léon Gambetta Ernest Renan	Amiral Aube Gloire Marseillaise Condé
Cruisers 2nd Class	Diana Minerva	Doris Venus	Gloucester Liverpool	Bristol Glasgow	..	..	..
Cruisers 3rd Class	Barham Medea	..	Boadicea Blanche	Bellona	6	Du Chayla† Forbin† Friant†	Cassard
Destroyers	11	..	24	24	11	10	12
Attached to Destroyers	..	..	Blenheim 1 Scout	Blake 2 Scouts	..	..	..

* In dockyard for refit. † In Morocco. ‡ To be transferred to 2nd Division. § Cruising in S. America.

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battleships of the Arpad class, and the two small armoured cruisers Kaiserin Maria Teresa and Kaiser Karl VI.

Ships in commission.

Europe.

The following table gives the number of battleships in commission for the British, German and French Navies for 1903 and following years. We have 28 battleships in full commission and ten (Third Division Home Fleet) in commission with nucleus crews. The battleships in the Fourth Division Home Fleet are not included in the total given below. The Germans have only 16 in full commission and six in reserve.

Year.	GREAT BRITAIN.					GERMANY.		AUSTRIA.		FRANCE.		
	Home.	Channel.	Mediterranean.	Atlantic.	Total.	Battle Fleet.	Reserve.	Active.	Reserve.	Active.	Reserve.	Total.
1903	—	10	14	6	30	8	—	—	—	6	3	14‖
1906	13	16	8	8	45	15	8†	—	—	6	3	15‖
1908	12*	14	6	6	38	16	3§	—	—	6	6	12
1909	16	8‡	6	6	36	16	3§	3	3	6	6	12
1910	16	11‡	6	6	39	16	8	3	3	12	2	14
1911	16	11‡	6	6	39	16	6	5	3	12	2	*14

* Six in full commission. † Includes eight coast-defence ships.
‡ Third Division Home Fleet. § Includes two coast-defence ships.
‖ Includes Northern Squadron.

North Atlantic.

The United States Atlantic Fleet comprises 16 battleships, organised in four divisions, three armoured cruisers, besides scouts, destroyers, submarines, etc. Five battleships are in reserve, with reduced crews.

We still have only three third-class cruisers on the East Coast of North America and in the West Indies, but the British Force on this station has been increased by the Niobe, which has been sold to, and commissioned by, the Canadian Government.

Eastern waters.

Japan has in commission six battleships, two armoured cruisers and four protected cruisers. The following is a list of the Squadrons kept in commission by the other principal Naval Powers in Eastern waters :—

	Great Britain.	*Germany.*	*France.*	*United States.*
CRUISERS (1st Class)	Minotaur. Monmouth. Kent. ‡Powerful (A.)	Scharnhorst Gneisenau.	Montcalm	Manhattan.

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	Great Britain.	*Germany.*	*France.*	*United States.*
CRUISERS . . (2nd Class)	Newcastle. Highflyer (E.I.) Challenger (A.) Encounter (A.)		Dupleix. Kléber.	
CRUISERS . . (3rd Class)	Astræa. Flora. Perseus (E.I.) Proserpine (E.I.) Fox (E.I.) Philomel (E.I.) Cambrian (A.) Pegasus (A.) Pioneer (A.) Prometheus (A.) Psyche (A.) Pyramus (A.)	Condor (A.) Cormoran (A.) Leipzig. Nürnberg. Emden.		Albany. New Orleans.

A. = Australia. E.I. = East Indies.

The second-class cruiser Newcastle has replaced the first-class cruiser Bedford, which was wrecked in August, 1910, on the China Station, and on the East Indies Station the Highflyer has relieved the Hyacinth as flagship to the squadron. The Powerful will shortly be relieved. As already mentioned, the Montcalm and Kléber are to be transferred to the Reserve division at Brest.

The United States Pacific Fleet consists, as it did last year, of armoured cruisers. In the Philippines one armoured cruiser and two third-class cruisers, with some gunboats, destroyers, and submarines, are in commission.

Cape.

No alteration has been made in the Cape Squadron, the weakness of which was commented on last year. One first-class cruiser is required on this important station.

Comparative tables.

Considerable changes have been made in the comparative tables. Germany is displacing the United States as the second Naval Power of the world. The relative position of the other Naval Powers remains unchanged, though, if the present naval activity in Austria continues, the Austrian Navy will ere long take the place of the Russian or Italian Navies in the Tables.

A new Table (Table II.) has been inserted for cruiser-battleships, or battle-cruisers as they are frequently called. They are not well classified with the first-class cruisers, and they are more powerful fighting machines than most of the ships included in Table III. From the list of older battleships in this table there have been struck out the eight Royal Sovereign class (most of which will be sold or broken up in the course of the year), the four Brandenburg class (two of which have been sold to Turkey), the French Brennus, and the three Italian Sardegna class, which are over 20 years old and quite unfitted to take their place in the line of battle.

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The present position as regards battleships of all classes is shown in the following table.

	Britain.	Germany.	United States.	France.	Japan.	Russia.	Italy.
Built . .	52	25	29	16	13	7	8
Building .	15	16	6	8	3	7	4
Total .	67	41	35	24	16	14	12

In completed battleships we are inferior by two to Germany and the United States combined; and our relative position, whether compared with these two Navies combined or that of Germany alone, must constantly grow worse, as during 1911 and 1912 we shall only complete the same number of battleships as Germany alone; and the older battleships to be struck off the list will be more numerous in the case of Great Britain than in that of Germany.

Modern battleships.

Taking modern battleships (viz., those enumerated in Table I.), we have 33 ships completed to 39 for Germany and the United States.

The following Table is a forecast of the position at the end of the present and two following years. Further than this, no forecast approaching to accuracy can be made. In considering this Table it should be borne in mind that, owing to the present British practice of laying down ships in the last quarter of the financial year, and completing them in two years, the end of the calendar year is an unfavourable period for Great Britain for making the comparison. For instance, six battleships will be probably completed before March 31st, 1912, only three of which will be completed by December 31st, 1911:—

	Britain.	Germany.	United States.	France.	Japan.
1910 (end) .	33	19	20	7	9
1911 (to be completed)	3	3	2	5	—
1911 (end) .	36	22	22	12	9
1912 (to be completed)	3	3	2	1	2
1912 (end) .	39	25	24	13	11
1913)to be completed)	4	3	2	2	—
1913 (end) .	43	28	26	15	11

In modern battleships as in the total of battleships of all classes our relative position will continue to deteriorate. At the present time Germany and the United States have an advantage in six ships; at the end of 1913 this will be increased to 11 ships

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Dreadnoughts.

The following Table gives the figures of Dreadnoughts and ships launched since 1906, which may be considered fit to "lie in a line" with them. In a question of such vital importance to our future it is as well to recognise the fact that the Germans are able to complete their ships in 30 months or less.

	Britain.	Germany.	United States.	France.	Japan.	Austria.	Italy.
Completed March 31, 1911 . .	10	4	4	0	2	0	0
" " 1912 . .	16	7	6	6	4	0	1
" " 1913 . .	20	13	8	6	5	2	2
" " 1914 . .	24*	16	10	8	5	4	4

* Assuming that one of the ships of the 1911-12 programme is a cruiser-battleship.

It is clear that in this class of battleship we are not maintaining the two-Power standard, and that our numbers may only equal those of the Triple Alliance in 1914. With regard to the latter comparison, it is doubtful whether the four Italian and the four Austrian battleships will be ready early in 1914. The Italians are notoriously dilatory in construction, while the Austrians have no experience of building such large units.

Cruiser-battleships.

It is noteworthy that a third Naval Power—Japan—has commenced to build cruiser-battleships, one having been laid down at Barrow in January last. Four have been completed for the British Navy, and four are building, in addition to the one now under construction for Australia. One has been completed for Germany, and four are under construction. In this class of ship there is some approach to the "two keels to one" standard.

First-class cruisers.

Except for the removal (already mentioned) of the cruiser-battleships to a separate table, there is but little change in the list, as no other armoured cruiser has been laid down during the past year. One has been completed for France, one for Japan, and two for Italy. The Bedford has been struck out of the list, as has also the Niobe, sold to the Canadian Government.

Second-class cruisers.

Five Bristols have been completed during the year under review, seven are under construction in addition to the two building for Australia. Vessels of this type are much needed for the protection of commerce; but though those now under construction carry a better armament than the five Bristols (viz., eight 6-in. guns), the armament is poor for the displacement and cost of the ships. It may even be doubted whether it is adequate to deal with a well-armed merchant cruiser. As mentioned last year, Japan is the only other Naval Power that is building second-class cruisers. She now has three under construction.

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Third-class cruisers.

One third-class cruiser has been completed for the British Navy, while three are under construction. The remark made as to the armament of the Bristols applies with greater force to these ships. Though they cost about £300,000 apiece, the armament is inferior to that of many of the older cruisers included in the list. For the German Navy two third-class cruisers have, as usual, been completed, and two have been laid down. In Italy the construction of three scout cruisers has been commenced.

Comparative expenditure.

The tables of total naval expenditure and of expenditure on new construction have been revised in the Parliamentary returns and in these tables. It is exceedingly difficult to arrive at the actual figure spent by most foreign powers on new construction. In 1911 Russia is largely, and Germany, France and Japan are substantially increasing their naval expenditure, while the Navy Estimates of the United States show a reduction. British expenditure on new construction will exceed that of Germany during the current year by nearly £3,000,000. Last year the excess was under £2,000,000. The present expenditure on new construction of the Triple Alliance—Germany, Italy, and Austria—would considerably exceed that of Great Britain; that of Germany and Austria is about the same as our own. Except under compulsion, the Italian Navy is not likely to be amongst our possible enemies. A noteworthy feature of the tables is the fact that Germany is able to devote more than half of her total naval expenditure to new construction. For the first time for several years the proportion in our case is more than one-third.

Conclusions.

It is clear from the foregoing survey that there can be no reduction in British Naval expenditure if the command of the sea, which is vital to our national existence, is to be retained. The relative strength of the British Navy compared with the German, as well as other navies is diminishing. The new construction proposed for the current year is barely sufficient to meet the case. The increased disposition of the outlying Dominions, and especially of New Zealand and Australia, to share with the Mother Country the burden of imperial defence is the most satisfactory feature in a situation not free from anxiety.

T. A. Brassey.

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TABLE I.—MODERN BATTLESHIPS.

Launched.	GREAT BRITAIN. Name.	Displacement. tons.
	King George V.	
	Ajax	23,000
	Audacious ...	
	Centurion ...	
	Conqueror ...	
1911	*Monarch*	
1911	*Thunderer* ...	22,500
1910	*Orion*	
1910	*Colossus*	
1910	*Hercules*	20,000
1909	Neptune	19,900
1908	Collingwood ...	
1908	St. Vincent ...	19,250
1909	Vanguard ...	
1907	Bellerophon ...	
1907	Temeraire ...	18,600
1907	Superb	
1906	Dreadnought ..	17,900
1906	Lord Nelson ...	16,500
1906	Agamemnon ...	
1903	Edward VII. ...	
1903	Commonwealth	
1903	Dominion ...	
1903	Hindustan ...	16,350
1904	New Zealand ...	
1905	Africa	
1904	Britannia	
1905	Hibernia	
1903	Swiftsure	
1903	Triumph	11,800
1902	Queen	
1902	Prince of Wales	15,000
1901	Albemarle ...	
1901	Cornwallis ...	
1901	Duncan	14,000
1901	Exmouth	
1901	Russell	
1898	Formidable ...	
1898	Irresistible ...	
1899	Implacable ...	
1899	London	15,000
1899	Venerable ...	
1899	Bulwark	
	43 ships.*	750,750

Launched.	GERMANY. Name.	Displacement. tons.
	Ers Weissenburg	
	Ers K. F. Wilhelm	
	S.	
	Ers Aegir... ...	
	Ers Hagen ..	
	Ers. Odin ...	
1910	*Oldenburg* ...	‡
	Ers Heimdall ...	22,000
1911	*Kaiser*	
1909	*Thuringen* ...	
1909	*Ostfriesland* ...	
1909	*Helgoland* ...	
1909	Posen	
1908	Rheinland	
1908	Nassau	18,200
1908	Westfalen ...	
1904	Deutschland ...	
1905	Hannover... ...	
1905	Pommern... ...	
1906	Schlesien	13,040
1906	Schleswig-Holstein	
1902	Braunschweig...	
1903	Elsass	
1903	Hessen	12,997
1903	Preussen	
1904	Lothringen ...	
1900	Wittelsbach ...	
1901	Wettin	
1901	Zähringen ...	11,643
1901	Mecklenburg ...	
1901	Schwaben... ...	
	31 ships.	◊ 525,200

Launched.	UNITED STATES. Name.	Displacement. tons.
	New York ...	
	Texas	27,000
	Wyoming... ...	
1911	*Arkansas*... ...	26,000
1910	*Florida*	
1909	*Utah*	21,825
1909	Delaware	
1908	North Dakota ...	20,000
1908	Michigan	
1908	South Carolina	16,000
1905	Idaho	
1905	Mississippi ...	13,000
1904	Connecticut ...	
1905	Kansas	
1904	Louisiana... ...	
1905	Minnesota ...	16,000
1906	New Hampshire	
1905	Vermont	
1904	Georgia	
1904	Nebraska	
1904	New Jersey ...	14,948
1904	Rhode Island ...	
1904	Virginia	
1901	Ohio	12,440
1901	Maine	
1901	Missouri	12,300
	26 ships.†	455,430

Launched.	FRANCE. Name.	Displacement. tons.
	Courbet	23,100
	Jean Bart ...	
1909	*Danton*	
1909	*Condorcet* ...	
1910	*Diderot*	18,028
1909	*Mirabeau*... ...	
1910	*Vergniaud* ...	
1909	*Voltaire*	
1903	Patrie	
1902	République ...	
1905	Liberté	14,635
1904	Justice	
1907	Vérité	
1904	Démocratie ...	
1899	Suffren	12,527
	15 ships.†	254,705

Launched.	JAPAN. Name.	Displacement. tons.
1910	*Kawachi*	20,800
	Settsu	
1907	Aki	19,800
1906	Satsuma	19,350
1905	Kashima	16,400
1905	Katori	15,950
1902	Iwami	13,516
1900	Hizen	12,700
1899	Asahi	15,200
1900	Mikasa	
1898	Shikishima ...	14,850
	11 ships. ¶	184,566

Launched.	RUSSIA. Name.	Displacement. tons.
	Sevastopol ...	‡
	Petropavlosk ...	23,000
	Gangut	
	Poltava	
1907	*Imperator Pavel I.*	17,200
1906	Andrei Pervozvannyi ...	
1906	*Ioann Zlatoust*	12,733
1906	*Evstafi*	
1903	Slava	13,516
1901	Cesarevitch ...	12,912
1900	Panteleimon ...	12,480
	11 ships.	190,774

Launched.	ITALY. Name.	Displacement. tons.
1910	*Dante Alighieri*	18,300
	Conte di Cavour	
	Giulio Cesare ...	21,500
	Leonardo da Vinci	
1904	Regina Elena ...	
1904	Emanuele III. ..	12,425
1907	Roma	
1905	Napoli	
1901	Re Margherita	13,214
1901	Benedetto Brin	
	10 ships.	158,928

* Four projected. † Two projected. ‡ Doubtful. ◊ 66,000 added for new ships. ¶ One Projected.

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TABLE II.—CRUISER BATTLESHIPS.

GREAT BRITAIN.			GERMANY.			UNITED STATES.			FRANCE.			JAPAN.			RUSSIA.			ITALY.		
Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.
		tons.			tons.			tons.			tons.			tons.			tons.			tons.
	Queen Mary ...	27,000		*K.*	21,500								A	27,500						
	Princess Royal	26,350		*J.*																
1910	*Lion*		1911	*Goeben*																
	New Zealand ...	18,800	1910	*Moltke*	†															
	*Australia** ...		1909	Von der Tann...	18,700															
1909	Indefatigable ...	18,750																		
1907	Indomitable ...	17,250																		
1907	Inflexible																			
1907	Invincible																			
	9 ships.	187,800		5 ships.	104,700								1 ship.	27,500						

* Australian Navy. † Doubtful.

TABLE III.—OLDER BATTLESHIPS.

GREAT BRITAIN.			GERMANY.			UNITED STATES.			FRANCE.			JAPAN.			RUSSIA.			ITALY.		
Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.
		tons.			tons.			tons.			tons.			tons.			tons.			tons.
1897	Canopus		1896	Kaiser Friedrich III.		1898	Wisconsin ...	11,653	1896	Bouvet	12,007	1898	Sagami	12,674	1893	Tria Sviatitelia	13,318	1897	E. Filiberto ...	9,645
1899	Glory					1898	Alabama	11,565	1895	Massena	11,735	1900	Suo		1892	Georgi Pobiedonosetz	10,280	1897	Saint Bon... ...	
1898	Albion	12,950	1897	Kaiser Wilhelm II		1898	Illinois		1896	St. Louis	11,090	1896	Fuji	12,320						
1898	Goliath					1898	Kearsarge... ...	11,540	1896	Gaulois	11,105	1894	Tango	10,960	1896	Rostislav	8,880			
1898	Ocean		1899	Kaiser Wilhelm der Grosse ...		1898	Kentucky... ...		1895	Charlemagne ...	11,108									
1899	Vengeance ...					1896	Iowa	11,340	1893	Jauréguiberry...	11,637									
1894	Magnificent ...		1900	Kaiser Barbarossa	10,974	1893	Indiana		1893	Charles Martel	11,693									
1895	Majestic					1893	Massachusetts...	10,288	1894	Carnot	11,954									
1895	Prince George...		1899	Kaiser Karl der Grosse		1893	Oregon		1899	Henri IV. ...	8,807									
1895	Victorious ...																			
1896	Cæsar	14,900																		
1896	Hannibal																			
1896	Illustrious ...																			
1895	Jupiter																			
1896	Mars																			
	15 ships.	211,800		5 ships.	54,870		9 ships.	100,067		9 ships.	101,136		4 ships.	48,628		3 ships.	42,758		2 ships.	19,290

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TABLE III.—FIRST-CLASS CRUISERS.

GREAT BRITAIN.			GERMANY.			UNITED STATES.			FRANCE.			JAPAN.			RUSSIA.			ITALY.		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
kts.		tons.	kts.		tons.	kts.		tons.	kts		tons.	kts.		tons.	kts.		tons.	kts.		tons.
23½	Minotaur	14,600	23	Blücher	15,253	22	Washington ...	14,500	23	Edgard Quinet	13,780	21	Ikoma	13,750	21	Rurik	15,170	22½	Amalfi	9,832
23½	Shannon		22½	Scharnhorst ...	11,420	22	Tennessee ...			*Waldeck-Rousseau* ...		21	Tsukuba		22	Adm. Makaroff		22½	Pisa	
23½	Defence		22½	Gneisenau ...		22	Montana		23	Ernest Renan...	13,427	22	Ibuki	14,620	21	Bayan	7,900	22½	San Giorgio ...	
23	Duke of Edinburgh	13,550	21	Roon...	9,350	22	North Carolina		23	Jules Michelet	12,370	22	Kurama		21	Pallada		22½	San Marco ...	
23	Black Prince ...		20½	Prinz Adalbert	8,858	22	St. Louis	9,700	21	Aso	7,726	21	Aso	7,726	20	Gromoboi	12,336	20	Giuseppe Garibaldi	7,294
23	Achilles		20½	Friedrich Karl...		22	Charleston ..		22	Léon Gambetta		20	Kasuga	7,700	20	Rossia	12,130			
23	Cochrane		20½	Prinz Heinrich	8,759	22	Milwaukee ...		22	Jules Ferry ...	12,351	20	Nisshin							
23	Natal		19	First Bismarck.	10,570	22	West Virginia		22	Victor Hugo ...		21	Idzumo	9,750						
23	Warrior					22	California ...		21	Condé		21	Iwate							
22½	Devonshire ...	10,850				22	Colorado	13,680	21	Gloire	9,856	20	Yakumo	9,850						
22½	Antrim					22	Maryland... ...		21	Marseillaise ...		21	Adzuma	9,436						
22½	Argyll					22	Pennsylvania ...		21	Amiral Aube ...		21½	Asama	9,700						
22½	Carnarvon ...					22	South Dakota ...		21	Gueydon		21½	Tokiwa							
22½	Hampshire ...					21	Manhattan ...	8,200	21	Montcalm ..	9,367									
22½	Roxburgh ...					21	Brooklyn	9,215	21	Dupetit Thonars										
23	Monmouth ...	9,800							21	Jeanne d'Arc ...	11,092									
23	Kent																			
23	Essex																			
23	Berwick																			
23	Cornwall																			
23	Cumberland ...																			
23	Donegal																			
23	Lancaster ...																			
23	Suffolk																			
23	Drake	14,100																		
23	Good Hope ...																			
23	King Alfred ...																			
23	Leviathan ...																			
21	Aboukir	12,000																		
21	Bacchante ...																			
21	Cressy																			
21	Euryalus																			
21	Hogue																			
21	Sutlej																			
20½	Amphitrite* ...	11,000																		
20½	Argonaut* ...																			
20½	Ariadne*																			
20½	Spartiate*... ...																			
20½	Andromeda* ...	11,000																		
20½	Diadem*																			
20½	Europa*																			
22	Terrible*	14,200																		
	42 ships.	629,850		9 ships.	152,845		15 ships.	186,595		15 ships.	169,027		13 ships.	138,052		6 ships.	63,336		7 ships.	61,210

* Protected Cruisers.

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TABLE IV.—SECOND-CLASS CRUISERS.

GREAT BRITAIN.			GERMANY.			UNITED STATES.			FRANCE.			JAPAN.			RUSSIA.			ITALY.		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.
25½	*Chatham*		21	Kaiserin Augusta	5,956	22·8	Columbia	7,375	21	Dessix	7,578	26	*Hirado*	4,800	18	Pamyat Azova	6,734	20	Carlo Alberto ...	6,396
25½	*Dublin*					23	Minneapolis ...		21	Dupleix		26	*Shikuma*		20	Aurora	6,731	20	Vettor Pisani ...	
25½	*Southampton* ...	5,400	19½	Freya	5,569	21½	Olympia	5,870	21	Kléber		26	*Yahagi*		20	Diana	6,630	19	Marco Polo ...	4,511
25½	*Melbourne*† ...		19½	Hertha											23	Askold	5,905			
25½	*Sydney*†		19½	Victoria Luise					20	Dupuy de Lôme	6,676	22½	Chitose	4,760						
24½	*Dartmouth* ...								19	D'Entrecasteaux	7,995	22½	Kasagi	5,416	23	Bogatyr	6,645			
24½	*Falmouth* ...	5,250	19½	Hansa	5,791				23	Guichen	8,151	23	Soya	6,500	23	Kagul				
24½	*Weymouth* ...								23	Châteaurenault	7,898	20	Tsugaru	6,630	23	Otchakoff				
24½	*Yarmouth* ...		19½	Vineta					18	Bruix	4,735				23	Oleg	6,675			
25	Bristol								18	Charner	4,702									
25	Glasgow								18	Latouche-Tréville	4,681									
25	Gloucester ...	4,800							19	Pothuau	5,374									
25	Liverpool ...								23	Jurien de la Gravière ...	5,595									
25	Newcastle ...																			
19½	Crescent	7,700																		
20	Edgar	7,350																		
20	Endymion ...	7,350																		
19½	Gibraltar	7,700																		
20	Grafton	7,350																		
20	Hawke	7,350																		
19½	Royal Arthur ...	7,700																		
20	Theseus	7,350																		
19½	Diana																			
19½	Dido																			
19½	Doris																			
19½	Eclipse																			
19½	Isis	5,600																		
19½	Juno																			
19½	Minerva																			
19½	Talbot																			
19½	Venus																			
19	Furious	5,750																		
19	Vindictive ...																			
20	Hermes																			
20	Highflyer ...	5,600																		
20	Hyacinth																			
21	Challenger ...	5,880																		
21	Encounter ...																			
	38 ships.*	211,860		6 ships.	34,245		3 ships.	20,620		12 ships.	78,541		7 ships.	23,306		8 ships.	52,619		3 ships.	17,303

* Three projected.

† Australian Navy.

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TABLE V.—THIRD-CLASS CRUISERS.

Speed.	Name.	Displacement.
kts.		tons.
25	*Active*	3,440
25	*Amphion*	
25	*Blonde*	
25	Blanche	3,360
25	Bellona	
25	Boadicea	3,300
23	Amethyst... ...	
22	Diamond	3,000
22	Sapphire	
22	Topaze	
19½	Astræa	
19½	Cambrian... ...	
19½	Charybdis ...	
19½	Flora...	4,360
19½	Forte...	
19½	Fox	
19½	Hermione... ...	
19½	Æolus	
19½	Brilliant	3,600
19½	Iphigenia	
20	Latona	
19½	Melpomene ...	3,400
20	Sappho	
20	Scylla	
19½	Sirius	3,600
20	Terpsichore ...	3,400
19	Philomel	2,575
20½	Pelorus	
20	Proserpine ...	
20	Pegasus	2,135
20	Perseus	
20	Prometheus ...	
20	Pyramus	
20	Pandora	
20	Pioneer	2,200
20	Psyche	
	36 ships.‡	109,485

GERMANY.

Speed.	Name.	Displacement.
kts.		tons.
	Ersatz Cormoran	
	Ersatz Condor	
	Ersatz Bussard	
	Ersatz Falke ...	
27	Augsburg ...	4,280
27	Köln...	
25½	Kolberg	4,234
25½	Mainz	
24½	Emden	3,544
24½	Dresden	
23½	Stuttgart	
23½	Nürnberg... ...	3,396
23½	Stettin	
23	Königsberg ...	3,346
23	Bremen	
23	Hamburg ...	
23	Berlin	
23	Munchen	3,200
23	Lubeck	
23	Leipzig	
23	Danzig	
21½	Frauenlob ...	2,657
21½	Arcona	
21½	Undine	
21	Medusa	2,618
21	Nymphe	
21	Amazone	
21	Ariadne	
21½	Thetis	2,603
21	Gazelle	
21	Niobe	3,712
20	Gefion	
20	Irene...	4,233
19	Prinzess Wilhelm ...	
	34 ships.†	98,459

UNITED STATES.

Speed.	Name.	Displacement.
kts.		tons.
24	Birmingham ...	3,750
24	Chester	
24	Salem	
18½	Detroit	2,089
18½	Marblehead ...	
18½	Montgomery ...	
20	Albany	3,487
20	New Orleans ...	
20	Baltimore... ...	4,413
18	Chicago	5,273
19	Newark	4,098
19½	San Francisco...	
19	Cincinnati ...	3,213
19	Raleigh	
	14 ships	49,799

FRANCE.

Speed.	Name.	Displacement.
kts.		tons.
20	Davout*	3,031
20	Linois*	2,308
20	Gallilée*	2,318
20	Lavoisier	2,285
20½	D'Estrées... ...	2,421
20½	Infernet*	2,435
19	Alger	4,313
19	Isly*	4,406
19½	Chasseloup-Laubat* ...	3,824
19½	Friant	3,882
19½	Pascal*	3,951
19	Descartes	3,970
19	Cassard	3,890
19	D'Assas*	3,962
19	Du Chayla ...	3,890
19	Catinat*	4,048
19	Protet*	4,001
20½	Cosmao	1,923
20½	Forbin	1,935
20½	Lalande*	1,968
20½	Surcouf	2,012
	21 ships.	66,773

JAPAN.

Speed.	Name.	Displacement.
kts.		tons.
23	Tone...	4,035
20	Akashi	2,657
20	Suma	
19	Akitsushima ...	3,150
17	Chiyoda	2,450
17	Hashidate ...	4,277
17	Itsukushima ...	
18½	Naniwa	3,700
18½	Takachiho ...	
20	Niitaka	3,365
20	Tsushima... ...	
20	Otawa	3,000
25	Sutsuya	3,080
	13 ships.	43,713

RUSSIA.

Speed.	Name.	Displacement.
kts.		tons.
19	Almaz	3,285
23	Jemtchug ...	3,106
	2 ships.	6,391

ITALY.

Speed.	Name.	Displacement.
kts.		tons.
26	*Quarto*	3,400
26	*Marsala*	
26	*Mino Rizio* ...	
18	Etna	3,470
17½	Fieramosca ...	3,534
17	Stromboli... ...	2,836
21	Piemonte	2,597
17	Calabria	2,428
18	Elba	2,690
17½	Giovanni Bausan	3,277
19	Etruria	2,245
18	Liguria	
18	Umbria	
17	Lombardia ...	2,351
20	Puglia	2,498
	15 ships	43,616

‡ One projected. † Two projected. * Probably to be condemned as ineffective.

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TABLE IV.—SECOND-CLASS CRUISERS.

GREAT BRITAIN.			GERMANY.			UNITED STATES.			FRANCE.			JAPAN.			RUSSIA.			ITALY.		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.
25½	*Chatham*		21	Kaiserin Augusta	5,956	22·8	Columbia		21	Desaix		26	*Hirado*		18	Pamyat Azova	6,734	20	Carlo Alberto ...	
25½	*Dublin*							7,375												6,396
25½	*Southampton* ...	5,400	19½	Freya		23	Minneapolis ...		21	Dupleix	7,578	26	*Shikuma*	4,800	20	Aurora	6,731	20	Vettor Pisani ...	
25½	*Melbourne*† ...											26	*Yahagi*		20	Diana	6,630	19	Marco Polo ...	4,511
25½	*Sydney*†		19½	Hertha	5,569	21½	Olympia	5,870	21	Kléber					23	Askold	5,905			
24½	*Dartmouth* ...		19½	Victoria Luise					20	Dupuy de Lôme	6,676	22½	Chitose	4,760						
24½	*Falmouth*								19	D'Entrecasteaux	7,995	22½	Kasagi	5,416	23	Bogatyr				
24½	*Weymouth* ...	5,250	19½	Hansa					23	Guichen	8,151	23	Soya	6,500						
24½	*Yarmouth* ...				5,791										23	Kagul	6,645			
25	Bristol		19½	Vineta					23	Châteaurenault	7,898	20	Tsugaru	6,630						
25	Glasgow														23	Otchakoff				
25	Gloucester ...	4,800							18	Bruix	4,735				23	Oleg	6,675			
25	Liverpool								18	Charner	4,702									
25	Newcastle ...								18	Latouche-Tréville	4,681									
19½	Crescent	7,700							19	Pothuau	5,374									
20	Edgar	7,350							23	Jurien de la Gravière ...	5,595									
20	Endymion ...	7,350																		
19½	Gibraltar	7,700																		
20	Grafton	7,350																		
20	Hawke	7,350																		
19½	Royal Arthur ...	7,700																		
20	Theseus	7,350																		
19½	Diana																			
19½	Dido																			
19½	Doris																			
19½	Eclipse																			
19½	Isis	5,600																		
19½	Juno																			
19½	Minerva																			
19½	Talbot																			
19½	Venus																			
19	Furious	5,750																		
19	Vindictive ...																			
20	Hermes																			
20	Highflyer ...	5,600																		
20	Hyacinth																			
21	Challenger ...	5,880																		
21	Encounter ...																			
	38 ships.*	211,860		6 ships.	34,245		3 ships.	20,620		12 ships.	78,541		7 ships.	23,306		8 ships.	52,619		3 ships.	17,303

* Three projected.

† Australian Navy.

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TABLE V.—THIRD-CLASS CRUISERS.

Speed.	Name.	Displacement.
kts.		tons.
25	*Active*	3,440
26	*Amphion*	
25	*Blonde*	3,360
25	Blanche	
25	Belluna	
25	Boadicea	3,300
23	Amethyst	3,000
22	Diamond	
22	Sapphire	
22	Topaze	
19½	Astræa	4,360
19½	Cambrian	
19½	Charybdis	
19½	Flora	
19½	Forte	
19½	Fox	
19½	Hermione	
19½	Æolus	3,600
19½	Brilliant	
19½	Iphigenia	
20	Latona	3,400
19½	Melpomene	
20	Sappho	
20	Scylla	
19½	Sirius	3,600
20	Terpsichore	3,400
19	Philomel	2,575
20½	Pelorus	2,135
20	Proserpine	
20	Pegasus	
20	Perseus	
20	Prometheus	
20	Pyramus	
20	Pandora	2,200
20	Pioneer	
20	Psyche	
	36 ships.‡	109,485

Speed.	Name.	Displacement.
kts.		tons.
	Ersatz Cormoran	
	Ersatz Condor	
	Ersatz Bussard	
	Ersatz Falke	
27	Augsburg	4,280
27	Köln	
25½	Kolberg	4,234
25½	Mainz	
24½	Emden	3,544
24½	Dresden	
23½	Stuttgart	3,396
23½	Nürnberg	
23½	Stettin	
23	Königsberg	3,346
23	Bremen	3,200
23	Hamburg	
23	Berlin	
23	Munchen	
23	Lubeck	
23	Leipzig	
23	Danzig	
21½	Frauenlob	2,657
21½	Arcona	
21½	Undine	
21	Medusa	2,618
21	Nymphe	
21	Amazone	
21	Ariadne	
21½	Thetis	2,603
21	Gazelle	
21	Niobe	3,712
20	Gefion	
20	Irene	4,233
19	Prinzess Wilhelm	
	34 ships.†	98,459

Speed.	Name.	Displacement.
kts.		tons.
24	Birmingham	3,750
24	Chester	
24	Salem	
18½	Detroit	2,089
18½	Marblehead	
18½	Montgomery	
20	Albany	3,487
20	New Orleans	
20	Baltimore	4,413
18	Chicago	5,273
19	Newark	4,098
19½	San Francisco	
19	Cincinnati	3,213
19	Raleigh	
	14 ships	49,799

Speed.	Name.	Displacement.
kts.		tons.
20	Davout*	3,031
20	Linois*	2,308
20	Galliée*	2,318
20	Lavoisier	2,285
20½	D'Estrées	2,421
20½	Infernet*	2,435
19	Alger	4,313
19	Isly*	4,406
19½	Chasseloup-Laubat*	3,824
19½	Friant	3,882
19½	Pascal*	3,951
19	Descartes	3,970
19	Cassard	3,890
19	D'Assas*	3,962
19	Du Chayla	3,890
19	Catinat*	4,048
19	Protet*	4,001
20½	Cosmao	1,923
20½	Forbin	1,935
20½	Lalande*	1,968
20½	Surcouf	2,012
	21 ships.	66,773

Speed.	Name.	Displacement.
kts.		tons.
23	Tone	4,035
20	Akashi	2,657
20	Suma	
19	Akitsushima	3,150
17	Chiyoda	2,450
17	Hashidate	4,277
17	Itsukushima	
18½	Naniwa	3,700
18½	Takachiho	
20	Niitaka	3,365
20	Tsushima	
20	Otawa	3,000
25	Sutsuya	3,080
	13 ships.	43,713

Speed.	Name.	Displacement.
kts.		tons.
19	Almaz	3,285
23	Jemtchug	3,106
	2 ships.	6,391

Speed.	Name.	Displacement.
kts.		tons.
26	*Quarto*	3,400
26	*Marsala*	
26	*Mino Bizio*	
18	Etna	3,470
17½	Fieramosca	3,534
17	Stromboli	3,836
21	Piemonte	2,597
17	Calabria	2,428
18	Elba	2,690
17½	Giovanni Bausan	3,277
19	Etruria	2,245
18	Liguria	
18	Umbria	
17	Lombardia	2,351
20	Puglia	2,498
	15 ships	43,616

‡ One projected. † Two projected. * Probably to be condemned as ineffective.

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Effective Fighting Ships, Built and Building.

Class.	Great Britain.			Germany.			United States.			France.			Japan.			Russia.			Italy.		
	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.
Battleships:—																					
Modern ...	33	10	43	19	12	31	20	6	26	7	8	15	9	2	11	4	7	11	6	4	10
Cruiser ...	4	5	9	1	4	5								1	1						
Older... ...	15	—	15	5	—	5	9	—	9	9	—	9	4	—	4	3	—	3	2	—	2
Total ...	52	15	67	25	16	41	29	6	35	16	8	24	13	3	16	7	7	14	8	4	12
Cruisers:—																					
1st Class ...	42	—	42	9	—	9	15	—	15	14	1	15	13	—	13	6	—	6	7	—	7
2nd Class ...	29	9*	38	6	—	6	3	—	3	12	—	12	4	3	7	8	—	8	3	—	3
3rd Class ...	33	3	36	30	4	34	14	—	14	21	—	21	13	—	13	2	—	2	12	3	15
Total ...	104	12	116	45	4	49	32	—	32	47	1	48	30	3	33	16	—	16	22	3	25

* Includes Australian ships.

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Torpedo Flotillas.

Class.	Great Britain.			Germany.			United States.			France.			Japan.			Russia.			Italy.		
	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.
Destroyers ..	173	32	205*	89	24	113	29	13	42	65	20	85	58	6	64	97	2	99	21	8	29
Torpedo Boats† 1st & 2nd Class	54	—	54	48	—	48	32	—	32	191	—	191	48	—	48	32	—	32	43	30	73
Submarine Boats	67	12	79	8	16	24	19	16	35	61	23	84	12	2	14	31	4	35	7	12	19

* 20 projected.

† Excluding boats over 20 years old.

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Total Naval Expenditure.

—	Great Britain.	Germany.	United States.	France.	Japan.	Russia.	Italy.
	£	£	£	£	£	£	£
1902	31,003,977	10,044,031	16,203,916	12,184,683	3,632,619	10,446,392	4,840,000
1903	35,709,477	10,401,174	16,824,058	12,292,227	3,611,786	12,349,567	4,840,000
1904	36,859,681	10,102,740	20,180,310	12,382,433	2,061,322	11,949,906	5,000,000
1905	33,151,841	11,301,370	24,444,948	12,667,856	2,341,194	12,392,684	5,040,000
1906	31,472,087	12,005,871	21,358,199	12,245,740	6,187,667	12,490,444	5,322,154
1907	31,251,156	14,225,000	21,260,732	12,486,793	7,227,232	8,850,240	5,661,822
1908	32,181,309	16,490,000	26,438,434	12,797,308	8,094,884	10,222,733	6,266,193
1909	35,831,800	19,702,685	28,990,592	13,353,824	7,202,823	*9,895,641	6,537,118
1910	40,603,700	21,235,090	27,001,866	15,023,019	7,608,081	9,723,574	7,458,426†
1911	44,392,500	22,053,626	25,989,498	16,654,621	8,803,015	12,197,251	7,802,494

* Net Estimate. † Includes Supplementary Estimate.

Amount Voted for New Construction.

The Actual Expenditure for Great Britain is shown in Italics.

	Great Britain.	Germany.	U. States.	France.	Japan.	Russia.	Italy.
	£	£	£	£	£	£	£
1902	10,436,520 *(9,782,217)*	4,662,769	4,701,121	5,325,929	—	2,904,096	1,254,787
1903	11,473,030 *(12,399,133)*	4,388,748	5,327,367	4,528,621	—	3,268,755	1,183,338
1904	13,508,176 *(13,184,419)*	4,275,489	6,611,909	4,370,102	—	4,480,188	1,121,753
1905	11,291,002 *(11,368,744)*	4,720,206	8,683,000	4,705,295	—	4,576,370	1,714,556
1906	10,859,500 *(10,486,397)*	5,167,319	6,776,086	4,652,010	752,595	4,576,583	1,362,207
1907	9,227,000 *(8,849,589)*	5,910,959	4,872,888	4,138,967	3,233,298	2,846,268	1,398,111
1908	8,660,202 *(8,521,930)*	7,795,499	6,227,874	4,193,544	2,967,918	2,703,721	1,866,358
1909	11,227,194* *(11,053,318)*	10,177,062	7,976,897	4,517,766	2,345,572	1,758,487	2,190,707
1910	13,279,830	11,392,856	†6,889,005	4,977,682	2,692,260	1,424,013	2,662,406
1911	15,063,877	12,250,269	†5,343,782	‡5,767,537	—	—	—

* Includes Supplementary Estimate, £689,100.

† This is the figure given for the "Increase of the Navy" in the United States Estimates. It does not include certain items which increase the totals given for previous years in the Parliamentary Return.

‡ Estimated probable expenditure on new ships.

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CHAPTER IV.

German Naval Administration.

The administration of the German Navy, which has been so brilliantly successful in practice, and has led to results of such far-reaching importance, cannot but be a subject of the greatest interest to officers of other navies to study. The object of this chapter is, as far as may be possible, to show the principles of German administration and the machine at work. A larger view of the subject would imply nothing less than a history of the development and changes in the German Navy, as reflected in the ideas, purposes, plans, and actions of statesmen and naval administrators. A narrower view might lead us merely into a description of the structure of the organisation in departments and branches. It would, no doubt, be of high interest to show how the modern German Navy came into being, what was the administrative work of men like Prince Adalbert of Prussia and Admiral von Stosch, to trace the conception of the "Flottengründungsplan" of 1869, later changes, and the Navy Law and its amendments, to illustrate the relation of economic developments to naval expansion and administration, and to indicate the influence of the Emperor, and of successive Imperial Chancellors and Naval Secretaries, on the execution of the work. All this, however, would lead us too far afield.* On the other hand, a mere description of administrative departments (of the organisation as then existing, Captain Ferber gave a brief summary in the *Naval Annual* of 1897) might be unattractive, and is, perhaps, unnecessary.

Historical.

Some brief account of German administrative developments is required for a full understanding of what follows. The first naval armaments of Prussia in 1848 did not demand a special naval department, the work being undertaken by the War Ministry and the boards subject to it. After a short time a naval branch of the

* Those who are interested in the general question of the influence of national developments on administrative effort may read with advantage some of the writings of "Nauticus": "Politische Machtstellung und Kriegsmarine" (a comment on the "Flottennovelle," 1900); "Das Erstarken der Völker zur See" (*Jahrbuch*, 1901); "Weltpolitik und Seemacht" (*Jahrbuch*, 1903); and "Zehn Jahre Flottengesetz" (*Jahrbuch*, 1910).

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War Ministry was constituted, with depôts at Danzig, Stettin, and Stralsund, annexed to the military boards at these places. By royal decree of November 14th, 1853, an independent naval board was created, under the name of Admiralty (*Admiralität*), which was further organised in the next year. In 1859 the Admiralty was divided into two separate boards, respectively for the chief command (*Oberkommando*) and the administrative duties (*Marineverwaltung*), and in 1861 the administration was converted into a Naval Ministry (*Marineministerium*), under the direction of General von Roon, Minister of War, whose more important duties were the direction of the military affairs of Prussia. At the same time the dockyards, depôts, and store branches were brought directly under the influence of the commanders-in-chief at the Home ports, whose duties were enlarged. The system remained unchanged until after the war of 1870–71, when the *Oberkommando* was again absorbed, and an undivided Admiralty was instituted as the chief authority in the transaction of the duties both of command and administration. The control was with the Emperor, and under his authority the Imperial Chancellor directed the affairs of the Navy. This latter arrangement was modified in March, 1878, and there was a great reorganisation in March, 1889. The Admiralty was at that time again separated into two great departments, corresponding with its two functions, one for the chief command—the *Oberkommando*, under the Emperor —and the other responsible for naval administration, being the Imperial Navy Office (*Reichs-Marine-Amt*). At the same time, for dealing with personal affairs and appointments, the Emperor's Naval Cabinet was created, the duties having been discharged before by a branch of the Military Cabinet.

The separation proposed to be effected between the offices of command and administration by this arrangement did not prove entirely satisfactory. The elements which it was thought might properly be attributed to the several departments had been adopted as constituting a basis for a distribution of duties and functions in the organisation, but it was soon found in practice that the vital inter-relationships between the departments made further changes essential. No satisfactory separation had been arrived at, and for this reason, by a Cabinet order of March 14th, 1899, a complete reorganisation was effected.*

Changes of 1899.

The system then introduced merits the closest attention, though it seems to be little understood, because it established conditions and principles which have ever since ruled in the German Navy. An account of the organisation will show how widely the German

* *Marineverordnungsblatt*, 1899 (xxx. Jahrg.), No. 6 (Order No. 58).

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system differs from our own, and will suggest that it presents some advantages, under the constitution of the Empire, which are denied to the administration of the British Navy under the constitution of the kingdom. By this order the Emperor assumed command (*Oberbefehl*) of the Navy in the same manner in which he exercised command of the Army. The *Oberkommando* of the Navy was abolished, but that section of it which had dealt with staff duties was erected into the Admiral Staff of the Navy (*Admiralstab der Marine*), with its head and seat in Berlin, and its chief was made directly responsible to the Emperor, independently of all other officers. Rear-Admiral Bendemann was the first officer to hold this important position. A noteworthy feature of the rearrangement was that the following officers were also brought immediately under the Emperor, with the privilege of approaching His Majesty directly: (1) the Commanders-in-Chief at the Home Ports (*Marine-Stationen*); (2) the Inspector of Training; (3) the Chief of the First Squadron (now the High Sea Fleet); and (4) the Chief of the Cruiser Squadron. Their positions are known as *Immediatstellen*, and their relations to the supreme Chief of the Navy concern only their special duties and appointments.

By this reorganisation the position of the *Reichs-Marine-Amt* remained unaltered, and, independently of the *Admiralstab*, it is directly under the authority of the Emperor. By the same important order, the Emperor reserved to himself the right of appointing an Inspector-General of the Navy, and on the same day (March 14th, 1899) Admiral Koester was nominated to that position, which is now held by Prince Henry of Prussia.

The Imperial Navy Office.

We have now reached a point at which, before dealing with the important subject of the Admiral staff, something may be said concerning the general functions of the Imperial Navy Office, whose chief—at the present time Grand-Admiral von Tirpitz—is Naval Secretary of State and Prussian Minister of State.† Naval administration is a department of the Imperial administration, but since the definition of the duties of the Imperial Chancellor by the so-called "Stellvertretungs-Gesetz" of May, 1878, that high officer has had no practical concern with the affairs of the Navy. The Imperial Navy Office is responsible for everything that relates to the *matériel* and *personnel* of the Navy. A brief description of its operations is that it deals with everything that costs money. It is, for example, concerned with the design and construction of ships, and whatever belongs to them. It is the seat of naval administration, but the authority

† It should be observed that, as a Prussian Minister of State, the Naval Secretary is a member of the Bundesrat, and in that capacity appears before the Reichstag (of which he is not a member) where naval affairs are concerned.

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and direction are with the Emperor, before whom all business nominally goes, and by whom all important decisions are taken. The chief of the Imperial Navy Office has the duty of advising the Emperor in all questions of naval administration, and he is ex-officio president of all boards and committees in his department, Certain other high officers, as has been shown, may approach His Majesty also, and may lay before him proposals for reform or improvement, but in doing so they cannot go beyond their special functions, which relate to what may be described as branches of general naval policy. If their proposals should tend to influence the *matériel* of the Navy, either in regard to organisation or the improvement of ship types, they must act in co-operation with the Imperial Navy Office, and in such case proposals are always laid before the Emperor.

System and duties of the Imperial Navy Office.

The Imperial Navy Office has relations with the other great State Departments, and chiefly with the Imperial Exchequer Office in the preparation of Estimates, with the Federated States of the Empire, through its chief being a member of the Bundesrat, and with the Reichstag on the discussion and voting of the Estimates. The Department includes a number of branches and sections, carrying on the whole business of the Navy. Ships and shipbuilding, new construction, machinery, armaments, equipments; the *personnel*, training, victualling, clothing, health, sanitation; the administration of ships in commission at home and abroad;* tactics in relation to training, as also hydrography and navigation; direction and control of dockyards, and relations with private yards; intelligence services in the narrow sense of information, while such principal duties as are executed by the British Naval Intelligence Department are in Germany discharged by the Admiral Staff; transports and affairs of the mercantile marine; and railways and telegraphy affecting the Navy—these are among the functions and duties of the Imperial Navy Office, which, for the rest, may be said, with the exception of duties reserved to the Admiral Staff, to undertake all such duties as are executed, *cæteris paribus*, by the British Admiralty and the naval departments of other States. From one of its branches for internal administration the *Marineverordnungsblatt* is issued, and the *Marine Rundschau* comes from its Intelligence Branch. It is the source from which official regulations are issued to the Fleet. Subject to the Imperial Navy Office, under special instructions, are the Inspectorates of Training, Torpedo, Naval Ordnance, Coast Artillery, Marine Infantry, and Depôts, as well as the Government

* In all political and military concerns of ships on foreign stations, they are under the direct control of the Emperor, whose orders to them are issued through the Chief of the Admiral Staff.

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of Kiao-chau, the dockyards, trial committees, the shipbuilding inspection committee at Hamburg, the commissioner for the Kaiser Wilhelm Canal, coast districts, the sanitary service, etc.

The manner in which the work of the Navy Office is conducted may be inferred from the following instruction and counsel of an experienced naval administrator: "The officials of the Imperial Navy Office have not only their daily duties to fulfil, but also uninterruptedly to consider whether, and in what direction, the duties they execute are capable of assuming a more suitable form or of being improved in their essential character. Likewise, while exerting the means at hand, they must not have in mind merely the immediate advantage, but must consider how these means may be used with the fullest and best results, and how, with relatively restricted employment of them, the greatest consequences may be attained." *

The Admiral Staff. How it differs from the Army Great General Staff.

The reference which has been made to the access of other officers besides the State Secretary to the Emperor relates chiefly to the duties of the Admiral Staff of the Navy, which, as has been said, came into existence in its present form in 1899. The *Immediatstellen* of the other officers who have been referred to concerns more restricted or specialised duties. It must not be supposed that the Admiral Staff of the German Navy resembles in any great degree the Great General Staff of the Army. That they have the same broad function is, no doubt, true, but the essential and fundamental difference between naval and military operations has made inevitable a variation in their character and duties. The Chief of the Army Staff studies all campaigns likely to occur, and prepares plans for them. He studies foreign armies and foreign methods of war. He is in close touch with the Army, and officers selected for Staff duties return to regimental or corps duties, establishing an interchange, whereby the ideas of the Staff are carried to the Army, and the ideas of the Army are brought up to the Staff. Army Staff officers prepare in advance for the transport of the military forces, they are concerned with the movement of troops by rail and road, the regulations for various arms, the practical duties of billeting, supply and mobilisation, and with other matters, all of which they actually apply in the field. The influence of the Army Staff is traceable in every question relating to organisation and instruction, and Staff officers are constantly in the saddle in close intercourse with the troops, familiar with the whole intricate machinery of land warfare, and training themselves for the practical conduct of war. Moreover, the officers of the Staff are largely occupied in the training of younger officers,

* Koch, "Einführung in die Marineverwaltung," 1904.

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as a growing aristocracy of military talent, for whom the chief appointments are ultimately reserved. There is a clear distinction, and yet a vital interrelation, both in the Army and Navy, between the department whose purpose is to attain the objects of war, and the department whose business is the management of the administrative machine.

Positions and functions of the Admiral Staff.

The Admiral Staff is not upon the same scale as the Army Staff. Its chief and its officers have an advisory function only. They are not concerned, except indirectly, with administration, and have nothing to do with finance. Primarily, it may be said that the Chief of the Admiral Staff is the Emperor's adviser on general policy in regard to the expansion, movements, distribution, and use of the Fleet. Necessarily he must often act in association with the Secretary of the Navy Office. His duties are concerned with the broad attributes of command. He and his officers study the requirements of naval warfare, and prepare plans for operations and action. Strategy and tactics are their province. There is no fully organised and regular system of interchange between the Admiral Staff and the naval forces, as there is between the Army Staff and the military forces, though the Emperor can and does provide for a certain interchange. An experienced flag officer is chosen as Chief of the Admiral Staff, and officers are selected on the ground of suitability for the several duties. There appears to be no intention of making the Admiral Staff an aristocracy of talent, and an avenue to the more important appointments and commands. At the present time, in addition to the Chief of the Admiral Staff, 22 naval officers are attached, five of whom are chiefs of sections, as well as an engineer officer and seven pensioned officers. There is also a bureau president, with 15 secretarial officers, as well as clerks, cartographers, draughtsmen, photographers, and others, and the annual cost is £16,091 (1911), as compared with £16,006 in 1910. Part of the work of the Admiral Staff is historical. Thus the new and extended edition of Captain Alfred Stenzel's "Seekriegsgeschichte" is prepared by Vice-Admiral Hermann Kirchhoff, in collaboration with the Admiral Staff.

The Chief of the Admiral Staff.

Bronsart von Schellendorff mentions, as a signal merit of the Army Great General Staff, that its chief is independent, and gives the impulsion to the work of that Staff. Though with restricted functions—one should perhaps say opportunities or requirements of the service—the Chief of the Admiral Staff is also independent until he touches practical requirements. He appears to have no direct official relations with the State Secretary of the Navy Office, and it might be thought that here was presented a source of danger, or of at least difficulty. It is conceivable that the Staff might, for example,

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attach greater importance to the subject of submarine warfare than was assigned to it by the State Secretary, or *vice versa*, or that one of these officers might set higher value upon the use of the aeroplane by the Navy than the other. But it is a fact known to all concerned with the work of administration in any sphere that, though a faulty system may conduce to difficulties, it is powerless to impede the work of really able administrators. Where men of high character and loyal purpose are working for the same end, difference of opinion cannot persist. Personal relationships transcend official barriers, and in mutual discussion and good understanding difficulties disappear. The great and even extraordinary success which has attended the administration of the German Navy forbids us to think that any difficulty has arisen from the separation between the functions of the State Secretary and the Chief of the Admiral Staff.

Dual responsibility—the safeguard in the German system.

But the German system of government provides a remedy for any difficulties that might arise of the kind suggested. The Emperor is the supreme fount of authority, and the two naval chiefs are subject to him, as are the other officers who are privileged directly to approach him. It is for his Majesty to decide upon all important questions that are submitted to him, and thus no final conflict of authority can arise. This is the supreme merit of the German organisation.

I am here led incidentally to make the remark that such a system could not apply to the administration of the British Navy, in which the chief of the Navy is a civilian-member of a party government, incompetent, by the very nature of things, to act in a capacity like that of the German Emperor. Thus it follows that any British chief of the Naval Staff must necessarily be within the department of the First Sea Lord, and be subject to that officer.

The Admiral Staff in war.

The importance and duties of the Chief of the German Admiral Staff are necessarily greatly enlarged in time of war. If it is his business to secure victories, his powers, under the Emperor's authority, must then be practically unlimited, for the Command must be supreme in obtaining all the requirements for the attainment of military objects, and inquiry into ways and means must come later. When such circumstances arise the Imperial Navy Office must inevitably conform to the demands of the immediate situation. In peace time, however, the conditions are different, because the Command is then compelled to recognise the restricted means which are available to the department concerned with the great business of management. At the same time the Command has the right and duty of demanding that the preparations of the Administration shall conform to naval necessities and foreseen future requirements. But

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Geheimer Admiralitätsrat Koch says, in his "Einführung in die Marineverwaltung," that generally, in peace time, the direct influence of the command (*Kommandogewalt*) upon the administration does not exist, except by way of request, and that the administrative boards have on their part the right and duty of examining the demands presented to them from the point of view of existing resources and supplies. The same authority shows that the two departments in the Fleet are practically in intimate relations for the conduct of affairs.

The broad features of the German system, which have been described, illustrate the fundamental principles of the administration. We are now able to see how policy is conceived and directed. In the councils of the Empire the successive Navy schemes and the Navy Law and its amendments have been prepared and planned. The great work has, no doubt, fallen upon the Chief of the Navy Office, whose functions have been executed with signal success for many years by Grand-Admiral von Tirpitz, but the Chief of the Admiral Staff has thrown his weight into the scale, and the Emperor has given energetic support and sanction to what has been done. Their labours have been very long and very anxious, but administrators and the administrative system have proved equal to the strain.

Ship design.

We have now reached a point at which it may be possible to show, to some extent, how the plans of the high authorities of command and administration receive practical effect, but the subject is a wide one, and the inquiry must be limited. The shipbuilding plan, being laid down by the Navy Law, the number of vessels of the various classes to be built in each year is known. The qualities and characteristics which it is desirable to embody in these ships are considered and discussed by the naval officers and ordnance authorities at the Imperial Navy Office, and are submitted to the Construction Department of that office for complete technical examination. In this department are a number of experienced shipbuilding and other officers and officials, whose duties are to examine special matters, and who are in a sense the advisers of the Chief Constructors of the Navy. It must be pointed out that there is not in the German Imperial Navy Office a single Chief Constructor as in the British Admiralty; neither is there a Designs Committee. When all the particular questions have been discussed and the plans have taken shape, a joint meeting takes place of the naval and technical groups of officers, under the presidency of the State Secretary of the Navy, at which the proposals are specially examined in relation to financial possibilities, and at which any particular points are decided. The State Secretary, however, is alone responsible for

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the development of any type of ship, except that, when the plans have been fully prepared, it is his duty to submit them to the Emperor.

The Admiral Staff is without direct influence upon the development of ship types. At least it is true to say that the organisation does not provide for the intervention of the staff. Nevertheless, inasmuch as naval officers of the Admiral Staff and the Imperial Navy Office are often interchanged between the two departments, and they pass from naval duties afloat to administrative duties on shore, and return to duties afloat, it is fully assured that naval influence is exerted in the expression of tactical principles and ideas in the developments of ship design. The two great departments being located in Berlin, there is a natural exchange of views between their several officers, and the Emperor finally decides, upon the representation of the State Secretary, on the characteristics to be given to any new type of ship.

Ship construction; private yards and tenders.

When the plans have received His Majesty's approval, they are sent, with detailed instructions, to the Imperial and private yards for the offer of building proposals. Both for shipbuilding and the building of machinery, estimates are opened publicly so that the work may be conducted as economically as possible, and the Imperial Yards have the duty of regulating prices. For the final decision as to where a ship is to be built the State Secretary is responsible.

When a ship is to be constructed in a private yard, technical officials of the Navy are appointed to supervise the work, as also to test and receive materials, acting thus as controlling officers of the Imperial Navy Office, to which it is their duty to report. When the ship has been built and the machinery is installed, the private trials take place, conducted by the *personnel* of the building yard, and upon the results of these trials ships are taken over by the Navy, after further official trials of the ships, conducted by the naval *personnel*. It must be remarked, with relation to ordnance, that there is no publication of tenders, as is the case of hulls and machinery, because at the present time all guns for the Navy come from the Krupp company, while the torpedo armaments are provided from the Imperial factory at Friedrichsort.

But, before all this happens, the Bundesrat has considered the proposals generally, and the Reichstag has made financial provision. The operations which have been described, including estimates of cost, employ a large part of the energies of one side of the Imperial Navy Office. An estimate (*Geldbedarfsberechnung*) of the total cost of the Navy Law was prepared, spreading the expenditure over the years up to 1917, and showing the amounts to be borne respectively by the

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ordinary estimates and by loans, but a revision was made in 1908, owing to the increased cost of shipbuilding, and new docking facilities and fortifications required, as well as the increased complement of ships.

Annual Estimates—Exchequer, Bundesrat and Reichstag.

But the yearly budget, for shipbuilding and every other purpose, is at the base of all administrative operations, and the Imperial Navy Office, in preparing its estimates, has to take account of the whole work of the year. The proposals have to undergo a triple examination—from the Imperial Exchequer, the Bundesrat and the Reichstag. The relations between the Exchequer and the Navy Office on the question of naval expenditure are a matter of high policy in the government of the Empire. The influence of the Bundesrat is exerted only in securing the co-operation of the four Kingdoms and the Grand-Duchies, Duchies, Principalities and free towns which constitute the German Confederation. The action of the Reichstag is different. The Estimates for any particular year, to become effective on April 1st, must be laid before it on December 1st of the previous year, and before the Bundesrat two months earlier, so that in the previous spring and summer, and still earlier, the State Secretary, the heads of his departments, the superintendent officers at the dockyards, heads of branches, and many others, have to discuss and prepare estimates of requirements. In the 1910 volume of "Nauticus" it is, indeed, stated that the officers in question have to agree, not as to what they actually require at the time, but as to what they will require eighteen months later. The conditions are not without a parallel in this country, but possibly it may be inferred that there is a real weakness in the system of German administration in these prolonged inquiries and discussions. "Nauticus" is neither an official nor a semi-official publication, but it has official approval; and it is significant that there should appear in it a chapter, from which the above remark is taken, wherein, in effect, an attack is made upon the bureaucratic system which is imposed upon the Department, chiefly by the Reichstag.

Influence of the Reichstag—"Bureaukratismus."

The Imperial Navy Office craves for the administrative freedom of the merchant conducting his business, which is represented as the very opposite of "Bureaukratismus." The Bundesrat having sanctioned the Estimates, they come before the Reichstag, and the Reichstag and its Budget Committee too often interfere with the details of naval administration. It has sometimes been said that the fluidity of the German Navy Estimates makes it difficult to say exactly what is being expended, for example, upon the shipbuilding of any particular year. Certainly, the Imperial Navy Office does

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not appear from "Nauticus" to be sensible of enjoying any such freedom as is suggested by this picture. The effort to gain greater control of the financial administration of the Navy has been more marked within recent years. A Reichstag deputy declared on December 7th, 1909, that detailed instructions for the Naval Department should be made effective. Another, in the same year, said that the administration would like to have no Estimates at all, but sufficient grants, and added, "We, however, in the Reichstag, have other interests; we desire specialised estimates, and that, if they are specialised, they shall be practically observed."

It is not necessary to go further into this discussion, but the character of the conflict, of which the Navy Estimates are the cause, when they are brought before the Reichstag, will be understood. There is not observable any real hostility to the Navy Estimates. Perhaps the Kiel dockyard case was the cause of much of the criticism, and certainly the results of the administration, notwithstanding the impediments of "Bureaukatismus," have been excellent. Thus, without comparing the German Navy with the British, "Nauticus" gave last year figures to show that it is built more economically than either the French Navy or the American. In 1897 the French Fleet possessed almost three times the strength of the German, and yet, though in the ten succeeding years about £36,000,000 have been expended upon it more than upon the German Navy, the latter was in December, 1909, stronger by 40,000 tons than the French.

Dockyards and private yards.

The shipbuilding programme of the year, having been approved by the Reichstag, becomes law, and it is then for the Imperial Navy Office to see to its practical execution. The ships and vessels may be built either at the State dockyards or in private yards. Although many of the largest ships have been built in the dockyards, and they are great shipbuilding centres, it may be said that the primary object of the Navy Office is to maintain them as establishments and bases for the repair, equipment, supply and mobilisation of the Fleet, and that in building ships at the State yards the intention is mainly to create and retain a large body of trained shipbuilders and artisans. The dockyards are directly subject to the Imperial Navy Office, and the directing officer, answering to a British Admiral Superintendent, is a flag officer or senior captain as "Oberwerftdirektor."

The Commanders-in-Chief ("Stationschefs") at Kiel and Wilhelmshaven are directly subject to the Emperor, and it is unnecessary here exactly to define their functions, or to lay down the line between them and the functions of the "Oberwerftdirector." Generally speaking, it may be said that their several duties are analogous respectively to those of the Commanders-in-Chief and Admirals-

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Superintendent at the British ports. The object of the dockyards, which are directly responsible to the Imperial Navy Office, has been defined as to build ships, maintain them in efficiency, and keep in readiness stores and everything that is necessary for their employment. Their three great departments are concerned with technical, administrative and managing duties. There are branches for general direction, construction, engineering, ordnance, equipment, stores, coal, oil, harbour, dock and yard administration, etc. The system is analogous to that existing in British dockyards, and the same is the case with ships built in private yards, under contract, and supervised by representatives of the Imperial Navy Office.

Work at the dockyards.

Many departments are concerned in the work at the dockyards. The "Stationsintendanturen" are important offices, whose duties were modelled in 1872 on those of the "Corpsintendanturen" of the Army. So far as they are concerned with the material of administration, their functions correspond with those of the working branches of the administrative department of the Imperial Navy Office. But the chief of an "Intendantur" is himself, as a naval officer, subject to the Commander-in-Chief. The "Intendantur" has also the review of accounts preliminary to audit, and other accounting duties. The administration of naval buildings and institutions, victualling, accountant offices, clothing stores, etc., are under its immediate direction. The clothing department has charge of factories, and discharges duties implied by its name. There is nothing like it in the British Service. It is unnecessary to do more than mention the torpedo factory, which is subject to the Director of Torpedoes, or the ordnance and mine, general and ship stores, for which there are special departments at the dockyards. These notes will serve to suggest how the work is carried on that gives effect to the plans of the Naval Authorities in the matter of shipbuilding and the maintenance of the Fleet. I may be permitted to add that I have been privileged, in peculiarly favourable circumstances, to visit the dockyards at Kiel and Wilhelmshaven, and that I brought away from them a strong impression of their working capacity, and of the administrative energy and efficiency which were visible in the shipbuilding, engineering, store and every other department of them.

Administration of the *personnel*.

This chapter would be incomplete without some notes on the administration of the *personnel* of the Navy. This also is the business of the Imperial Navy Office, both in regard to recruiting and training. The Emperor himself deals with the promotion, appointment and removal of officers, and his agency in this matter is the Naval Cabinet. By the "Deutsche Wehrordnung," 1904, para. 4 and 5, every German is subject to service either in the Army or

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Navy, from the completion of his 20th year to March 31st in the year in which he completes his 39th year, and the service in the Navy is apportioned in active service, reserve service, "Seewehr" (answering to the Army "Landwehr"), and Naval Ersatz reserve service. The "Marineordnung" (1909) shows (para. 2) that the Naval Service is incumbent on the seafaring and semi-seafaring population, the former being seamen by calling, or men of specified ratings or trades who have been at least one year at sea, or in coast or harbour craft, while the latter are men whose aggregate service in such capacities amounts to 12 weeks. The seamen (para. 3) are drawn from the coasts and the islands, or from among those who have been employed on the great rivers. They constitute the "Matrosendivisionen" on land, and form depôts for the supply of the seamen and other *personnel* to the Fleet. Special efforts are needed to secure a good class of men for the seamen-gunner ratings. The *personnel* of the "Werftdivisionen" are of the artificer and engineer class, as well as stokers, smiths and metal workers of all kinds, coming mostly from industrial establishments, and forming a depôt for supplying engineer and artificer ratings on board ship. For the clothing and other factories at the ports tailors, shoemakers, leather workers, and others of like trades are taken.

Many regulations apply to the service of the "one-year volunteers," most of whom are men of some education, with technical skill; and this applies especially to those enlisted in the "Werft" or so-called harbour division, including young men who have matriculated or passed the examinations at Charlottenburg, or the high schools at Hanover, Brunswick, Darmstadt, Dresden, Munich, Stuttgart and other centres. Most of the higher ratings in the Fleet are supplied by men who enter under special conditions as volunteers for three, four, five or six years, and who constitute a nucleus for the training of younger men. The administrative effort of the Imperial Navy Office has been successful in securing a very large proportion of volunteers, so that it is no longer strictly correct to speak of the German Navy *personnel* as a "conscript" force. The Boys' Division (boys entering at 15½) is also intended to train a considerable number of long-service men for the Fleet as warrant and deck officers.

These facts are stated in order to indicate the scope of another great branch of the work of the Imperial Navy Office. It is unnecessary for the present purpose to say much concerning the officers, but the system of entry may be explained. Cadets are admitted by a Reception Committee, and must possess certain educational qualifications or certificates, and be physically sound. A knowledge of English or French is essential. Five weeks' drill and

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military exercise on land, during which the cadets live on board, precedes the work of the training ships, after which follows a year as midshipmen at the Naval School. Those who wish to study the system of the entry and training of German Officers will, however, find all the regulations and instructions in the following publications, issued by the Imperial Navy Office, and published by Mittler in Berlin; "Vorschriften für die Ergänzung der Seeoffizierkorps," 1909; "Vorschriften für die Ausbildung der Seekadetten auf die Schulschiffen," 1910; "Dienstvorschrift für die Marineschule," 1910; and "Dienstvorschrift für die Marineakademie," 1910.

With these notes the subject of German Naval Administration shall be left. The merits of the system and the endeavour must be judged by their results. They are certainly in many ways remarkable, and, taking a broad view, they are generally phenomenally successful. The writer in "Nauticus," who frets so much under the bonds of the Budget, gives approval to a remark made by the *Post*, of Berlin, that control must remain, but it must not be the end and object of everything. It must be another kind of control, and he hopes it may be found in the education in naval things of the representatives of the people. He claims freedom of operations, so that the Navy may be managed in a commercial spirit and on business lines. Paraphrasing the words of Schiller in "Don Carlos," he says to the members of the Reichstag, "Geben Sie Bewegungsfreiheit!" But he recognises, at the same time, that it is a hard thing for representatives of the people, or even for Governments, to give all desirable freedom of operation to departments of the State.

JOHN LEYLAND.

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CHAPTER V.

Oil Engines *versus* Steam Turbines.

"The country that first takes hold of the principle of internal combustion will sweep the world commercially." This quotation is from remarks attributed to Lord Fisher by New York interviewers, otherwise clearly demonstrating his belief in the advantages of this type of engine for the propulsion of warships even of the largest class. It is only repeated here after ascertainment by the writer of its accuracy. The opinion, expressed with characteristic directness, is the more important in view of the position held, and the experience gained, by Lord Fisher, although it is important to note the use of the words "internal combustion" and not oil engine or gas engine, and the prominence given to the application of the idea to commercial work. The view expressed by so eminent an authority justifies a review of the question of the suitability of the internal combustion engine to supersede the steam turbine in warships and merchant steamers. It would be easy to prove also that the public is intensely interested in the subject, and that a widespread belief in favour of the newer system of propulsion is entertained in lay and professional quarters. There is more than a suspicion, however, that the prevailing optimism is based partly on somewhat roseate promises of results which have a provoking tendency to vanish when guarantees for their fulfilment are sought, and partly on a lack of knowledge as to the inherent difficulties to be overcome in the immediate application of the system for large powers. It becomes important, therefore, to examine the attitude of the engineering advisers of the principal naval Powers and the proposals under consideration or accepted, as well as to review present knowledge and experience before attempting to forecast the future possibilities of the internal combustion motor.

Attitude of British Admiralty.

The statements which have appeared in the daily press regarding the building of large marine internal combustion motors in Britain have no basis in fact. The subject, however, is being followed with that keen searching after truth which has been displayed for years in the Engineering Department of the Navy. Oil engines have been used for driving electric dynamos on board ship for years, and are fitted

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for the propulsion of boats carried by warships. With all of these engines extensive trials have been made, so that the department are in possession of data to guide them in estimating the difficulties to be overcome and in stipulating conditions to be met in the design and construction of engines for propelling warships. The inherent difficulties are recognised and are not deemed insurmountable, but it is considered that some actual experience with units suitable for use in 20,000 or 30,000 H.P. installations is necessary before a definite opinion can be formed as to how the new prime mover will compare in every respect with the steam turbine. Data collected as to cylinders of 100 or 200 H.P. fitted in marine engines do not justify deductions as to what is possible in installations where 1500 to 2000 H.P. must be developed by each cylinder. The most important proposal under consideration at the Admiralty is one to fit into an old 20-knot cruiser of the Latona Class, in place of one of the twin steam engines, a Vickers heavy oil engine of considerable power, with an air compressor to supply air for manœuvring and for assisting the engine to reverse. With this engine working alongside the existing steam engine, a thorough trial would be possible with cylinders of large size. As all doubtful points would thus be put to the proof, the Admiralty have full justification in embarking upon a practical test, irrespective of its cost.

United States Naval view.

Inquiries by the writer regarding the position in the United States of America—a great producer of oil—brings the following official information :—"Up to the present, we have done nothing with oil engines for ships, except for use in submarine boats. The latest designs of these will include heavy oil engines working on the Diesel principle. No progress up to the present time has been made in the Merchant Service with this type of engine. Considerable interest is being taken with oil engines, and the general opinion seems to be that within the next ten years this type of engine will be in general use."

Opinion of French Admiralty.

As regards France some progress has been made. Messrs. Schneider, of Creusot, have been making extensive tests of a single-cylinder engine, intended to develop 1000 B.H.P. The results are promising, and as the suggestions for improvements in details, which are being gained from experience, can be embodied in an engine with multiple cylinders of equal power, the probabilities of practical success with sets of engines of 9000 B.H.P. are favourable. Four such engines, each on a separate shaft, would suffice for a battleship. A well-informed correspondent states that "L'Amirauté Française paraît véritablement partisan de l'emploi du moteur à pétrole pour la propulsion des navires de guerre de toutes dimensions à condition qu'on

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puisse réaliser ce moteur d'une maniere vraiment pratique et sûre. Elle s'interesse vivement à nos travaux sur la matière et suit, avec le plus grand soin, les essais des moteurs à grand alesage que nous avons construits." Meanwhile, however, no internal combustion engine has been ordered for a large warship.

Action of German Naval authorities.

Official information from Germany is not easily got; but the present position seems to be that at least one firm has on order an engine of three cylinders, with all the working parts designed to develop in the aggregate between 3500 and 4500 H.P. Should this engine prove satisfactory in trials in the shops, three more cylinders will at once be built to give a six-cylinder engine approximating to 9000 B.H.P., which may be fitted to the centre shaft of a battleship, while the wing shafts will be driven by steam turbines. It is understood that the German Admiralty are partners in the experiment to the extent that, if success is achieved, they will pay liberally on the "time and material" principle, and in the event of failure will pay half of the costs. It is also said that a syndicate of warship builders has been formed to carry out experiments with oil engines, and that this syndicate is being assisted to the extent of 50 per cent. of its capital by the naval authorities. Little wonder need, therefore, be entertained that the internal combustion engine is making progress in Germany, and the lesson should be brought home to the Treasury at Whitehall, in order that money for such experimental work may be granted at once to our Admiralty.

Engine makers. Hesitancy as to guarantees.

The attitude of all naval authorities is thus hopefully expectant, although they are very properly acting cautiously and experimentally. That this is justified is proved by a remark attributed to Professor Flamm, a well-known German scientist favourably disposed towards the system, who said at the last meeting of the German Naval Architects that, as the result of inquiries he had issued for a 100 H.P. engine, only one firm had been willing to agree to take back their engine in the event of failure to meet the conditions specified; and that, too, although the price quoted was £2650—much higher than for steam engines.* Oil engine makers are not always certain of realising results, because each successive increase in power intensifies the difficulties of the problem. A fortunate feature is that public opinion has been aroused. Knowledge of the working of oil engines has been disseminated more widely than in the case of other engineering subjects, because of experience with motor-cars and motor-boats; but it cannot be too strongly enforced that the application of the system for high powers introduces very difficult problems.

* See *The Engineer*, December 2, 1910.

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Principle of internal combustion engine.

A correct understanding of these problems by the non-technical reader requires a brief explanation of the basal principle of the internal combustion engine as a preface to a fuller and technical consideration of the subject. In such engines there is an exact analogy to the firing of a projectile from a gun. Instead of one of the nitro-compound explosive powders, coal-gas or oil, mixed with air, is used within a cylinder, and its combustion propels a piston within the cylinder just as a projectile is driven from a gun. Indeed, the Vickers Company, in a large petrol motor constructed a few years ago, fitted to several of the cylinders a gun-breech mechanism in combination with a carburettor, so that an explosive cartridge could be ignited in some of the cylinders in succession. The firing of the cartridges set the engine revolving and caused the pistons to do the suction and compression of mixed air and gas, necessary to allow them to work subsequently with the petrol and air mixture. The breech mechanism was then put out of action, leaving the carburettors to supply the gas mixture to all cylinders in the usual way. The piston of the internal combustion engine, when driven downwards by the explosion of the coal-gas or oil and air, rotates the crank shaft; on the up-stroke the products of combustion are driven from the cylinder through an exhaust port. On the next downward stroke, air and coal-gas or oil are drawn through the inlet ports, and in the next up-stroke are compressed ready for ignition or explosion to give the next down working stroke. This is the most widely adopted system, and is known as the Otto or four-cycle. It is that on which practically all car and boat petrol motors work. But great changes have lately been introduced.

Relative advantages of various fuels for engines.

Before referring to these and the various designs of large engines now proposed, it is well to consider the relative advantages of the various fuels used for internal combustion engines. The so-called gas and oil engines have much in common; both are really gas engines. In the former, gas formed by the vaporization of any liquid hydro-carbonaceous product—petrol, gasolene, benzoline, paraffin, petroleum, crude oil, refined oil, or even residual oil—is mixed with air, and this, when compressed and ignited, gives by its explosion driving force to the piston. In the latter, the gas is got by the partial combustion of coal within a closed vessel called a producer. Oil commends itself as the more suitable for actuating marine engines, because the vaporizing of it is simple, and does not involve the extensive plant required for producing gas from coal. Moreover, it is easily shipped by pumps through pipes, and can be stowed in spaces otherwise of little use except for carrying water ballast.

Oil: its price and supply.

These are all advantages which appeal specially to the designer of warships. But naval authorities cannot altogether neglect

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commercial considerations. Oil is expensive, except in the countries where it is a natural product. Paraffin may be got in Scotland at 4½*d.* per gallon, but costs 1*s.* 8*d.* in India. Texas oil can be had in the ports of the Southern States at 30*s.* to 35*s.* per ton; but it costs much more at some naval ports. Crude oil at ports frequently visited costs 40*s.* per ton. There is also the fact that the great proportion of the world's oil supply is derived from foreign territory. But for the British Navy long contracts can be made on a favourable fixed basis, and provision made for the distribution to and storage at all naval coaling ports. That is the procedure now adopted in connection with liquid fuel for boilers for steam turbine installations, and the cost is understood to be about 40*s.* per ton, equal to 2*d.* per gallon in bulk at the merchant's wharf. Obviously by the time the oil gets to a coaling port in the Far East it is pretty expensive. Crude oils, if extensively used, must increase in price, as they are the principal sources from which the fine mineral oils, from petrol downwards, are derived, while the residual products, left after distillation, are more available, cheaper, and quite suited to most internal combustion engines. They are also safer, as the lighter hydrocarbons of the crude oils are liable to separate and form an explosive mixture with such air as may remain in a closed tank on shipboard. Some oils—such as creosote and refuse from gasworks—while cheap, smell badly, and even in merchant steamers the effect of this on the cargo must be considered. This is another good reason for preferring the residuum of distilled oils. The annual production of such residual oil in America, Russia, Galicia, Roumania, etc., is estimated at quite five million tons, while an increase in output is certain in the future, although the price must remain doubtful with increase in demand.

Quality of oil preferred.

Oil engines must consequently offer sound advantages in general efficiency, weight, adaptability and consumption over other prime movers before they can be preferred. In the Merchant Service, especially, economy, or financial results, naturally come first. There is little or no question as to the type of oil to be used. The lighter low-flash point gasolenes are out of court. The flash point first adopted by the Admiralty for oil fuel for steam boilers was 280° F., but this has now been reduced to 200° (Abel closed test), which is still higher than is allowed in the Merchant Service. The Admiralty specification requires the oil fuel to have a specific gravity of about 0·920 at 60° F., to be liquid at zero, to contain not more than 0·75 per cent. of sulphur, so as to obviate possible destruction of bronze fittings, and to have a calorific value of 19,600 British thermal units.

Coal-gas engines.

There are many claims advanced in favour of the use of the coal-

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gas engine, although its weight may be greater than with oil installations. The ease and cheapness with which coal can be got, especially in Britain, will certainly commend the system ultimately for the merchant marine, but, so far, the producers in commercial use cannot give off clean gas, free from pitch and tar, unless anthracite or coke be used. These fuels afford quite satisfactory results, but they are expensive—the price of the Scotch anthracite used in the Rattler, for instance, was 16*s.* 6*d.* per ton at the pit; Welsh anthracite is 25*s.* per ton at the pit, and much higher in foreign ports. There is thus, as with oil fuel, a commercial disability, and although anthracite is a home product, the adoption of the coal-gas engine installation loses some of its seductiveness if it be found that the weight of plant and cost are likely to be greater. Bituminous coal may be used provided gas cleansing plant is added, a complication which does not commend itself to naval authorities, for even although salt water could be used for the "scrubbing" of the gas—about two gallons per B.H.P. per hour developed by the main engines—the additional weight and complication would be considerable. Many are working at the producer problem in the hope that a method may be found of obtaining clean gas from the cheapest coal; and when success is achieved in this matter a great impetus will be given to the development in service of the internal combustion engine.

Coal-gas producers.

As a producer is not subjected to any pressure, it is much lighter than a steam boiler, being merely a shell with brick lining; it occupies less space; and it can be fired mechanically from a high-level platform. Leakage is rendered almost negligible, especially if the apparatus be worked on the suction principle, when the demands of the engine cylinders automatically regulate the rate of generation of the gas. It has been objected that with the suction system a serious condition might arise were the ship hove to in a fog and a sudden demand made afterwards on the plant to meet an emergency. The producer might not respond sufficiently quickly to the demands of the engine owing to the preceding omission of suction strokes for a period. But a suction fan could be fitted for use in such case, to exhaust to atmosphere through the engine exhaust when the engines were idle. This fan, too, could be used for slow manœuvring when the engine might be stopped for long periods. Its adoption, too, would obviate at such times the production of poor gas, which might cause missfires. Again, the steam needed for generating the gas could be supplied from vessels surrounding one or more producers With pressure producers, which would avoid some of the disadvantages stated, the dangers due to possible leakage could be overcome by causing the air-supply pipes to surround the producers

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and gas pipes, so that gas leakage would pass to the engine with the air. Either suction or pressure (forced) producers are thus feasible, if they could give cheap coal gas free from tar and pitch, which tend to clog the valves.

Already producers are at work with wood chips, sawdust, peat, native-made charcoal, cocoa-nut shells, leather, sugar-cane and refuse, as well as with coal, but in all such cases "scrubbers" are needed, and these are not acceptable to the marine engineer. Nor has the sulphate of ammonia recovery plant, which helps so greatly to pay the fuel bill in the case of some land stations, any place on board ship. The sulphate of ammonia recovered from this source from land stations equals 50 lb. per hour from each 1000 B.H.P. of output from gas engines requiring 1¼ lb. of fuel per B.H.P. per hour. This is a factor in the economy of industrial power production.

The conditions to be fulfilled by engines.

Whether operated by gas produced from coal or given off by vaporized oil, the design of the internal combustion engine differs but little, and, in any event, the conditions to be fulfilled in marine practice are identical. These conditions may first be stated before an examination is made of the various types of engines now being constructed or proposed for ship propulsion. For large powers the engine itself must be (1) reversible; (2) able to stop quickly; (3) able to start quickly from any angle at which the crank may be when stopped; (4) able to run at variable speeds down to something less than one-fourth the maximum revolutions; (5) able to pick up speed quickly; (6) able to govern itself upon the propeller emerging from the water in a seaway; (7) free from leakage of dangerous gases; (8) have adequate air supply without any admixture of oil, whether lubricating or burning; (9) have thoroughly satisfactory cooling arrangements; (10) have adequate dimensions of working parts to take the strain of unbalanced forces; (11) have free access to all parts requiring observation or overhaul; (12) have, as far as possible, a uniform turning moment to minimise vibration; and (13) have few complications and valves, in order to ensure reliability and easy and quiet running. There are also, of course, to be considered the claims of light weight, small space, limited headroom, and fuel economy. A few of these qualities are indispensable—others are desirable—in all propelling machinery, while the importance of the remainder varies with the character of the ship propelled. In warship work the questions of reliability and the reduction of weight and space have claims superior to economy; but in merchant work the financial considerations may be more fully met by increasing weights and reducing the fuel bill.

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Distinctive types of internal combustion engines.

A general consideration of the outstanding features of the engines now being built will enable the lay reader to follow more easily an examination as to how these desiderata in the marine engine are met. In the first place, there are what are known as the "constant volume" and the "constant pressure" engines. The former is the Otto cycle engine already described. In the latter, known as the Diesel system, a full charge of air—but of air only, and not air and oil—is drawn into the cylinder at each suction stroke of the piston. This air, on the return stroke, is compressed to about 500 lb. per square inch, raising its temperature to about 1500° F., which is sufficient to fire the charge of oil sprayed into the cylinder at the end of the compression stroke by a separate supply of highly-compressed air. As only air is compressed by the piston when at the full height of its stroke, there can be no pre-ignition, so that there is not only in the Diesel system an element of safety, but ignition gear is dispensed with, the number of working parts is reduced, the impulse to the piston is more gradual, owing to the gradual combustion of the charge, and consequently there is less variation of stress on the working parts and bearings. On the other hand, where, as in the Otto or constant volume engine, air and fuel vapour are sucked into the cylinder together, a separate ignition system is necessary, and the compression must not exceed the temperature of possible ignition —about 90 lb. per square inch.

The four-cycle engine.

The Otto system, again, is necessarily a four-cycle system, as defined on page 88. The Diesel system, on the other hand, while capable of following the four-stroke cycle, can be arranged to work on the two-cycle plan. In that case each downward stroke of the piston is impelled by expansion, while before and during the commencement of each upward stroke a scavenger charge of moderately compressed air cleans the burnt gases out of the cylinder, leaving it full of pure air. When the exhaust port is covered the pure air remaining is further compressed by the upward movement of the piston to fire the fresh charge of gas when admitted.

In the four-stroke cycle, whether of the Otto or Diesel type of engine, there is but one working stroke in two revolutions of the crank, whereas in two-cycle working there is a power-stroke every revolution. This constitutes, perhaps, the only advantage of the two-cycle engine; but it is not possible to get, as might at first sight appear, double the power for an equal number of revolutions per minute in a given size of cylinder. The operations of exhausting from the cylinder the gases resulting from combustion, and introducing into the same volume the fresh charge, have each to be accomplished in about one-twelfth of a revolution, whereas in a four-cycle

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engine the time of half of the revolution is available. There is thus in the four-cycle engine better cleansing of the cylinder and more regularity in the volume of the charge. As the running speed of the engine increases, the disadvantage grows more serious.

The two-cycle engine.

In such two-cycle Diesel type engines as are in use this disadvantage is partially overcome by having a separate pump on the crank shaft to compress the air used for cleaning or, as it is technically called, scavenging the cylinders. The idea is to expedite the emptying of a cylinder and the recharging of it with fresh air before the exhaust port is closed. To further facilitate this purpose, a vacuum is sometimes created in the exhaust pipe. A disadvantage of the two-cycle arrangement lies in the fact that with an explosion for every downward stroke the piston must get hotter, and may therefore require to be separately water-cooled. This is accomplished by means of a pipe with a telescopic end, working in a water reservoir at the side or under the engine, and taking from it a supply of cooling water through the piston.

Two *v.* four-cycle engine.

These may be justifiable complications. Many consider that they are. Dr. Diesel himself is reported to say that the two-cycle will supersede the four-cycle system. Its advantages include a more uniform turning moment of the crank with multiple cylinders, as each piston has a working stroke each revolution. Thus with five cylinders there will be five impulses per revolution of the crank shaft, instead of two and a half with two-cycle working, and therefore a more constant torque. The reversing problem, too, is simplified, as the direction of rotation is more quickly altered by compressed air when there is a working stroke each revolution. The exhaust ports are in the cylinder walls, and are opened and closed simply by the passage of the piston, instead of being on the top of the cylinder, as with the four-cycle engine. In the latter position the ports require valves which have to be cooled, while gear, in association with the cam shaft, must be interposed to operate them, adding to the complications of the engine. Experience will alone establish whether the two-cycle system is preferable to the four-cycle system, on a balance of advantages and disadvantages. This is one of the features which differentiate the Diesel types of engines now being introduced by British and Continental firms, and to be referred to later.

Two-cycle valveless engine.

A two-cycle valveless engine has been proposed, and where applied for small powers has worked fairly well. In this case the air inlet port is on one side of cylinder, the exhaust on the other, and the piston in its travel opens and closes them respectively at the correct time, in relation to the cycle of operation. On the upward stroke of the piston air and oil vapour are drawn into the closed

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crank chamber. On the down stroke this charge is somewhat compressed. When the air port is opened by the piston the charge first drives from the cylinder the products of combustion, which are deflected to the top of the cylinder for this purpose by an upward projection or baffle on the top of the piston opposite the inlet opening. The piston on the return stroke closes first the exhaust port, then the inlet port. The charge in the cylinder is then further compressed by the action of the piston, and exploded by the igniter. The disadvantages are that the time for the cycle of operations is limited; there is liability of air leakage through the crank pit; possibility of danger of premature firing, owing to some small hot spot in the combustion chamber, or hot gases remaining in the cylinder; cylinder cleansing is imperfect; and there is uncertainty as to the relative quantity of oil and air in the mixed charge, as some of the new charge may escape through the exhaust port before it is closed. The possible degree of expansion is, moreover, restricted; in other words, there is too much beyond the control of the engineer. The idea, however, is attractive owing to the absence of valves and complicated mechanism, and to the fact that the engine is easily reversed. These engines will run in whichever direction they are first set revolving. In the engine on this principle, manufactured by Messrs. Wm. Beardmore & Co., certain modifications have been introduced, principally to ensure the effective scavenging, and the engine is favoured for small powers. In the case of large-diameter cylinders there is an element of danger, as the piston rings may not easily pass the edges of the large openings, which would then be required for the inlet of air and the exhaust of the products of combustion.

Single-acting engines.

All of these alternative types of engines are single-acting, the work being done solely on the top of the piston. The steam-engine, on the other hand, is double-acting, since work is done on both the upper and lower sides of the piston. This has great advantages, as it gives a more even turning moment to the crank shaft, and increases the power per revolution and per unit of weight. Oil engines of the double-acting type on the Diesel design have been proposed in boats for the American Navy. Such engines, up to about 800 B.H.P., are in use. Apart from the duplication of valves on the top and bottom of the cylinders, and the complication of the mechanism for working them, there are serious heat difficulties. The piston, piston-rods, stuffing box glands, and all valves require to be water-cooled, but there is no insuperable difficulty.

The Vickers oil engine.

Practically all the marine oil engines being made, or, indeed, under consideration, by naval authorities, and for that matter by merchant ship-owners, are of the Diesel type, with modifications

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introduced by the various constructors, and they are either on the two-cycle or on the four-cycle single-acting principle, or on the double-acting principle. The Vickers Company, who, with characteristic enterprise, have done more in experimental and practical work than any of our naval construction firms, have adopted the Diesel two-cycle single-acting principle. Two-cycle engines up to 800 H.P., or 100 H.P. per cylinder, of their manufacture for submarine boats have worked admirably, with a fuel consumption in service of not more than ½ lb. of oil per B.H.P. per hour.

The rate of revolution of their engine for all types of ships can be reduced to less than one-fourth of full speed by simply varying the quantity of oil admitted into the cylinder. This is practically equivalent to varying the cut-off in the steam-engine, and is as easily accomplished. The oil is sprayed into the top of the cylinder by air at about 600 lb. pressure; any excess pressure in this respect is apt to lead to imperfect burning. The oil is ignited by the compression of the air in the cylinder, so that the only valves required are for the inlet of air, for scavenging, the inlet of fuel, and the inlet of air for starting—all being on the top of cylinder. Exhaust takes place through ports uncovered by the piston. Air is fed into the cylinder at about 4 lb. per square inch for scavenging and 600 lb. for injecting the fuel, the former from pumps worked from the crank shaft of the main engine, and the latter from separate three-stage compressors, which require to have a power of at least one-tenth of that of the main engines. This highly compressed air is stored in reservoirs, and is used from thence for starting up as well as for reversing the direction of rotation of the engines. The engine valves are worked from a cam shaft with levers fitted with springs, to obviate the chattering which constitutes such a noisy feature of badly designed and badly constructed oil engines. The reversing is probably the simplest hitherto used. When compressed air is admitted into that cylinder whose crank is in a position most favourable to starting up in the direction of rotation desired, the engine commences to rotate in that direction. The engine runs then under oil until again reversed in the same way by the use of air. Two revolutions with compressed air suffice to enable the oil fuel to get into operation, so that if desired the engines can be running at full speed in a few seconds, and almost at once in manœuvring if the engines have been under way for a minute or two.

The Carels engine.

The Vickers Co. have been in association with Messrs. Carels Frères, of Ghent, one of the most prominent gas and oil engine builders on the Continent. They have built many engines, ranging

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in the power of a single cylinder up to 1500 B.H.P., and are destined to take an important part in the development of the marine oil engine. But it is scarcely necessary to repeat the features of their engine in view of what has been written as to the Vickers engine. Their practice is tending towards longer strokes in order that built-up crank shafts may be used. They recommend five cylinders, with six cranks in three equal interchangeable pieces, the sixth crank driving the scavenging air pump. They anticipate using connecting rods, crossheads and piston rods, instead of the one rod with a gudgeon pin connection to the piston at one end and a crank pin connection to the shaft at the other. This will enable adjustable slipper guides to be fitted for the crosshead, an arrangement specially preferred by marine engineers. The firm attach great importance to effective scavenging. A Carels engine has reversed from full speed ahead to full speed astern in 15 seconds, which is, at least, equal to any steam-engine.

The Schneider engine.

Messrs. Schneider, of Creusot, are also in association in this matter with Messrs. Carels Frères. They also have preferred the two-cycle single-acting engine, with a scavenging pump. Their objection to the double-acting engine is its excessive complication, the difficulties of fitting the valves, and the increase in consumption—owing to the bad disposition of the valves under the cylinder—the difficulties inherent to the stuffing boxes of the piston rod, and the great headroom necessary, which makes the system objectionable for warships, as it could not be housed under the armoured deck. The single-acting engine, they state, is lighter per unit of power, and gives great range of power. They are fitting a 1800 B.H.P. engine to a 6500-ton intermediate cargo steamer France, being built at the Gironde Works at Bordeaux.

The Nurnberg engine.

The Maschinenfabrik Augsburg-Nürnberg A.G. have, on the other hand, taken up the construction of the double-acting two-cycle engine, but they also manufacture single-acting engines. Their type of engine has also been placed before our Admiralty by British naval construction firms. Up to January 15, 1911, the Nurnberg Co. had built or were building double-acting two-cycle engines totalling 11,000 H.P., single-acting two-cycle engines for light craft aggregating 13,400 H.P. and for heavy craft of 4180 H.P. collectively. The largest sets, each of 1500 H.P., are for a twin-screw Hamburg-America liner to be built at Messrs. Blohm & Voss's shipyard at Hamburg. The large engines, up to 2000 H.P., run at 185 revolutions, and are guaranteed by the makers to consume per B.H.P. per hour not more than 0·44 lb. of oil of 18,000 British thermal units per lb. They recommend six or eight cylinders for their large engines, to ensure a good turning

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moment. To keep the air reservoirs charged, and to supply the air in the cylinders, as well as for injecting the oil, a twin stage compressor is worked from the same shaft, in which respect their practice differs from that of other firms named. The method of providing the scavenging air is also different. Below the ordinary oil-working cylinder is an extension of greater diameter to serve as an air-cylinder, and connected to the ordinary piston is a second piston to fit the air-cylinder, in which the scavenging air is compressed to 6 lb. or 7 lb. above atmosphere, passing thence to a pipe common to all cylinders, and from this admitted to each cylinder near the end of the working stroke. The oil used for lubricating the working parts, including the pistons, is also utilised for cooling the top of the piston in the power-cylinder, a cooler being included in the forced lubricating system. One end of the piston oil-pipe is screwed through the piston to the top, the other end slides telescopically into a fixed pipe, which is connected to the oil well in the crank case.

The Dutch engine.

The engine built by the Dutch Engineering Co., of Amsterdam,* is of the Diesel four-cycle single-acting type, with a piston-rod, a crosshead working in slipper guides, and a connecting rod, as in the Carels engine. As the bottom of the cylinder is open, all working parts can be exposed for inspection, although the crank pits are enclosed by wide doors. The piston-rod is connected to the bottom of the piston by flange couplings, so that all the working parts can be removed downwards, including the piston, in any cylinder. The cylinders, 19·685 in. in diameter by 25½ in. stroke, are separate castings, and are all within a water-trough the full length of the engine—a system of water jacketing which makes for rigidity. Owing to the high speed—215 revolutions for 600 H.P.—and the shortness of the piston, the latter is water-cooled through a telescopic pipe, while the crank shaft bearings are cooled by pressure water; the top of the cylinder, on which are the four valves, is also water-cooled. The engine is changed in the direction of its rotation by compressed air. The compressors are worked from the main crank shaft; the fuel pumps are driven by an eccentric operated from the vertical governor shaft, which is connected with the eccentric shaft operating the valves. With oil of 18,000 British thermal units per lb., the consumption was, on trial, 0·37 lb. per H.P. hour at full load, 0·429 lb. at three-quarter load, 0·495 lb. at half load, and 0·77 lb. at quarter load. A similar engine of 500 H.P. is being built for a 1000-ton steamer.

* See *Engineering*, November 25, 1910.

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Other types of engine.

Other features are adopted in other designs. Messrs. Sulzer Brothers, Winterthur, adapt the compressed-air supply machine also for pumping water ballast and other purposes. The Société Anonyme des Forges et Chantiers de la Mediterranee, La Seyne, have taken up the manufacture in France of the Sulzer engine, and are manufacturing engines of 1000 to 1500 B.H.P. for torpedo, submarine and cargo boats. Messrs. Cockerill, of Seraing, are building their first Diesel type single-acting four-cycle engine with six cylinders and a central coupling on the crank shaft, so that three cylinders may be used when low power is desired, an arrangement adopted many years ago with the steam-engines of H.M.S. Blake and Blenheim. There are other engineers who contend that tandem cylinders should be fitted, the lower cylinder for explosive working and the upper for air compressing and air driving at starting up and reversing. This would involve a water-cooled piston-rod gland on the top of the oil cylinder and the extension of the rod through the combustion chamber, which, apart from the mechanical complications and the great height of the engine, are serious disadvantages. Messrs. Burmeister & Wain, of Copenhagen, and a well-known Swedish firm, are building marine oil engines of large power, and both are in association with British firms.

The size and power of cylinders.

This review of the work being done in Continental countries suggests that the recent awakening of our marine engine constructors was overdue, but that progress in the immediate future will, as a consequence, be the greater. It must be noted, however, that the largest cylinder so far made is only of 1500 B.H.P., and that only two or three firms have undertaken an experiment on this scale. Even in coal-gas engine land practice, greater power per cylinder than 2000 H.P. is unknown. Before the steam-engine was discarded in the Navy and high-speed merchant ships, cylinders giving 2500 to 3000 H.P. were not uncommon in merchant as well as naval ships; and now with the Parsons turbine we have reached over 20,000 H.P. per turbine. It is an easy calculation to determine how many cylinders, even of 2000 H.P. each, would be required to drive similar shafts in order to develop corresponding total power.

Increasing the power of oil engines.

The problem of increasing the power per cylinder, it is true, is practically only one of keeping the maximum temperature of combustion down to a reasonable limit, otherwise valves may melt and pass over as shot with the exhausted products of combustion. This has happened in small high-speed engines. Moreover, there is the important question of strength, cylinders of gas engines with walls 3½ in. thick being already in use on land installations. The expansive quality afforded by the Diesel principle may be developed, and

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compounding may be introduced by the working of cylinders in series. This involves a very high degree of compression, and incidentally great care in the manufacture of pumps, pipes, valves and reservoirs to withstand high pressure. But such demand for superior metal and workmanship is made with each successive advance in engineering. Again, the greatest care must be exercised in separating any lubricating oil which may pass into the storage system with the air, as the accumulation of a small quantity may involve explosion by the highly-compressed air. This also has been the cause of accident through centrifugal separators being neglected. Multiple oil sprays will have to be adopted, and great caution exercised to avoid any excess of fuel entering the cylinder, as the resulting increase of maximum pressure is liable to blow back a portion of the fuel into the injection air reservoir or passages leading thereto, whereby a disastrous explosion might occur. Increased size of cylinder involves fewer revolutions per minute, as well as a longer stroke, to give the charge a sufficient time to burn, and to allow the products of combustion to pass through the exhaust port.

Multiple *v.* high-power cylinders.

According to the informing report prepared by the Chief Engineer Surveyor of Lloyd's, Mr. J. T. Milton, Dr. Diesel is of opinion that "there are no reasons for limiting the size of cylinders other than those which apply equally with steam-engines." Cylinders are in course of construction up to 34¼ in., equal to 1200 B.H.P., but for large powers he "would prefer to use a greater number of cylinders rather than increase the diameter of individual cylinders." We yet lack experience of the working of larger cylinders than those of 700 H.P., so that we have some way to go before we have the much-predicted oil-motor battleship.

Desiderated conditions realised.

The details given of engines actually built assist in an analysis of the prospect of meeting the desiderated conditions for a marine oil engine, as already laid down on page 91. Compressed air admirably serves for reversing the engine and for starting it quickly in any direction from any position of the crank, and although this involves a separate auxiliary in the form of a compressor equal to a tenth of the power of the main engine, the weight is not augmented in the same ratio. The reversing of the Carels engine in 15 seconds is an important fact. Although clutches have been used for powers up to 2500 H.P. between engines and rolling mills, they cannot be entertained for marine engines. The clutch was the only unsatisfactory element in the coal-gas engine fitted with so much enterprise by Messrs. Beardmore to H.M.S. Rattler, and only removed because the Admiralty required the ship. The coal-gas or oil engine will stop as readily as a steam-engine, since oil and air supply can be cut

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off at least as easily as and more quickly than steam. The Diesel system, too, affords a satisfactory method of varying the speed to a nicety by varying the amount of oil sprayed into the cylinder. This method may be supplemented for very low speeds by reducing also the quantity of air. The former is preferable to governing by varying the charge, that is to say, the quantity of mixed air and gas admitted to the cylinder, a procedure sometimes adopted in the Otto cycle. The former is more exact in its regulation, and there is not the probability of misfires, as the temperature due to the compression is constant. Speed can be picked up as quickly as the mechanical conditions will admit; two revolutions under air suffice for the resumption of the oil cycle, and the power can be made at once as great as possible by adjusting the amount of oil admitted. Governing is as simple as with the steam-engine. Provision against leakage of vapours is important, but no trouble has been experienced with the oil fuel for boilers in warships. The provision of adequate air supply, the extraction of lubricating oil from the air, the reliability of air-storing and air-distributing appliances, as well as the dimensions of working parts and accessibility to units, are all questions of design and construction offering no insuperable difficulties. While in some degree new to marine work, these features are not unfamiliar to engineers, and the details given show that a great measure of reliability has already been attained. To the question of the turning moment reference will be made when the essential differences between the internal combustion engine and the turbine are dealt with later. Questions of weight, space occupied, and economy will also be discussed.

Propellers for oil engines.

There is no propeller problem; the speed of revolution does not require to be as great as with the steam turbine, and there is no need in either case to interpose speed reduction or transmission gear in fast ships. Indeed, it has been proved that the propeller efficiency with the higher shaft speeds introduced have been within 2½ per cent. to 5 per cent. of the best obtainable, with direct connection between turbine and propeller, and progress is still being made.

Difficulties in working auxiliary machinery in oil-engined ships.

The difficulties involved in the working of auxiliary machinery on shipboard are inherent to the system. In the case of all auxiliaries associated with the main engines, air, lubricating, and water pumps can be worked by oil-engines, or electricity generated by the same primary agency can be utilised. Power for hydraulic engines in connection with ordnance can similarly be provided, or electricity used. Steam is preferred for steering gears, anchor windlasses, winches, capstans, etc., and in some of the merchant ships now being fitted with oil engines a donkey boiler is being installed to run these

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deck machines. On the Hamburg-American ships, building at Hamburg, and to be engined by the Nurnberg Company, electricity generated by oil engines will be used. In other cases, compressed air is to be used from the reservoirs, being reheated, where necessary, by the exhaust from the main engines. The question of distilling water on board ship is not so easily overcome. The exhaust leaves the gas or oil cylinder at a temperature of from 800° F. to 1200° F., and is now cooled by water-jacketing the pipes or by sprinkling water among it, and it is proposed to utilise this heat in evaporators and distillers pretty much of the form of existing condensers. The idea is quite feasible, and only requires good workmanship generally, suitable metal, and tight joints to give a high efficiency, higher than with steam as the heating agent.

Experience gained in engining fishing vessels.

While little has been done in this country in the construction of high-power marine engines, there has been a great development in lighter engines of the ordinary Otto cycle type, using petroleum or paraffin. Although these have all depended for reversing on a clutch, they have enabled extensive experience to be won by several of our naval firms—Messrs. Beardmore, Palmers', Thornycroft, Yarrow, and others—and brief general reference is justifiable. These engines range up to 180 H.P., but the great majority have been of about 60 and 70 H.P. for fishing craft, to be used as auxiliaries to the sails in order to give a speed of about 8 knots. The 60 B.H.P. engine has two cylinders, 10 in. diameter by 15 in. stroke, and runs at 340 revolutions per minute, with a two-bladed bronze propeller, 3 ft. 7 in. diameter. These fishing-boats are all of about the same dimensions, namely, about 65 ft. long, 19 ft. beam, and about 70 tons displacement. The cost of a 60 B.H.P. marine set, fitted on board the fishing-boats complete, ready for sea, is £540. A full-powered drifter of 75 ft. long on the water-line, by 18 ft. 5 in. beam, by 6 ft. 6 in. depth, and of 85 tons displacement, has also been fitted by Messrs. Beardmore with a 95 B.H.P. engine, to give a speed of 8½ knots, to compete with the full-powered steam drifter. The motor vessel could be made smaller and cheaper, while having the same carrying capacity as the steam drifter, owing to the smaller machinery space. The running cost and upkeep of the motor vessel is less. A Thornycroft engine developing 35 H.P. at 550 revolutions consumed on trial only 2¾ gallons of paraffin per hour, which at 6*d.* per gallon is 1*s.* 4½*d.* per hour for constant work; and as there is no addition to the crew, and little expense otherwise, there is a great gain in the catching of the market when calms prevail. Palmers' engine of the Griffin type, rated at 75 B.H.P., burned on trial 1 pint per H.P. per hour of refuse oil, using a vaporizer, the heat for which was got from the

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exhaust gases. The total weight is 5 tons 17 cwts., and the space occupied 8 ft. 7 in. long, 5 ft. wide, and 5 ft. 7 in. high.

Oil-driven merchant ships being built in Britain.

What is of more importance is the number of oversea ships being built in this country to be fitted with oil engines for propulsion. One, the Toiler, a steamer of 1659 tons for the Canadian Lakes, has been built by Messrs. Swan, Hunter and Wigham Richardson, Wallsend-on-Tyne, and is being fitted with two sets of Swedish Diesel two-cycle reversible engines, each of 180 B.H.P., consuming per day 1·75 tons of fuel oil of 18,000 B.Th.U. calorific value. The steering gear, capstans, etc., will be worked by the stored compressed air reheated by the exhaust from the main engine. The vessel promises to be the first of the new type to cross the Atlantic. Messrs. Barclay, Curle & Co., Ltd., Glasgow, are building a 5000-ton steamer to be fitted by them with twin-screw Diesel type engines of 2500 B.H.P., and the design is that favoured by Messrs. Burmeister and Wain, Copenhagen, who are building two others for the Russian East Asiatic Co. The winches, windlasses, and steering-gear are to be worked electrically. These vessels will carry a limited number of passengers.

Gas-engined merchant ships.

An important experiment is being made with a coal-gas engine in this country in a steamer being built on the Tyne for Messrs. Holzapfel. This vessel is 120 ft. long, to carry 300 tons dead weight at 10 ft. draught. In it are fitted two producers for generating gas from anthracite coal for a six-cylinder engine of 180 H.P. at 450 revolutions per minute, made by Messrs. E. S. Hindley & Sons, Bourton, Dorset. The cylinders are $10\frac{3}{4}$ in. in diameter by 10 in. stroke, working with double ignition by magneto, and with cam motion for actuating the valves. Another feature is that between the engine and propeller there is a Föttinger transformer, as described in the *Naval Annual*, 1910, p. 141, for reducing the speed of the propeller independently of that of the engine, and for working the propeller astern at any speed while the main engine is running full speed ahead. This transformer is actuated from the navigating bridge. Another installation of corresponding importance is being fitted to an experimental 50 ft. passenger launch, in which there is a four-cylinder 45 H.P. Crossley gas engine, with gas producer and electric power transmission, reduction and reversing gear, on Messrs. Maver & Coulson's system, between the engine and the propeller.

Continental merchant ships with oil engines.

Of the Continental sea-going ships, the most notable are those for whose machinery the Nurnberg Co. are responsible. The engines in these vessels are to be of the double-acting two-cycle Diesel type. The first, a cargo ship 351 ft. long, has twin engines of 1000 H.P. at 130 revolutions per minute; the second, also built by Messrs. Blohm & Voss, of Hamburg, will be fitted by the same firm with engines

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from the same designs; the third, a Hamburg-American liner of 9000 tons, is to have two engines, each with six cylinders, which at 120 revolutions will give a collective power of 3000 B.H.P. Messrs. Carels Frères, of Ghent, have built several ships' engines, one of them being of 1000 H.P. Messrs. Schneider, of Le Creusot, have built many Diesel type four-cycle engines for submarine boats, with four cylinders 19·1 in. in diameter by 18·90 in. stroke, to give 700 H.P. at 300 revolutions, with compressor and pump, and with dynamos and motors for propulsion when the vessel is submerged. The engine for the 6500-ton French steamer already mentioned is also on the four-cycle single-acting principle. The two-cycle single-acting Schneider-Carels engine, with which Messrs. Schneider are experimenting, leads them to suggest that for a battleship with three lines of shafting a total power of 21,600 H.P. could be realised with six cylinders on each shaft, or 28,800 H.P. with eight cylinders.

Consumption of oil engines and of other machinery.

It is difficult, however, to get any definite figures as to the total weights, consumption, or space occupied. In the Diesel engines supplied to our warships by Messrs. Mirrlees, Bickerton & Day, Ltd., Stockport, the guaranteed consumption is 0·4 lb. per B.H.P. per hour, but with larger cylinders the efficiency might not be the same; and yet it must not be forgotten that the efficiency from boiler to turbine, even with superheated steam, is seldom more than 13 per cent. of the calorific value of coal, whereas in the Diesel type of engine the efficiency is 33 to 35 per cent. of the calorific value of the oil, and with the coal-gas engine, using suction producers, little less.

As regards the economy of larger units there are little reliable data, as results from actual experience are not available. The Nurnberg Co. stated to the writer that the fuel consumption of the engines of 1000 and 1500 H.P. being built for each of the twin-screw shafts of the Hamburg-built ships, including auxiliaries, is to be "about 0·48 to 0·5 lb. per B.H.P. per hour." This should be very acceptable if realised, as there are large air compressors to work. The British Admiralty have been satisfied with 0·56 lb. in Diesel ship-propelling engines of nearly the same power. The Dutch engine of 600 H.P., as already stated, gave its full power for 0·37 lb., ranging up to 0·77 lb., for quarter load. With coal-gas engines the consumption in land stations has been brought under 1 lb. per B.H.P. per hour; the marine steam reciprocating engine has given an economy for all purposes of 1¼ lb. per I.H.P. In one of the most recently tried torpedo-boat destroyers, where only oil fuel was used, the consumption was almost exactly 1 lb. per shaft H.P. per hour. With conditions more conducive to economy in larger ships, oil fuel, if used alone in the boilers, would give a lower

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rate. Oil when satisfactorily consumed in the boilers, *i.e.*, without undue pressing, evaporates from 14 lb. to 16 lb. of water from and at 212° Fahr., and the steam consumption of the Parsons reaction turbine has now been reduced to from 12½ lb. to 13 lb. of steam per S.H.P. for all purposes. In the case of the installation for some foreign battleships, where an intermediate pressure turbine is introduced between the one high and two low pressure turbines, giving a greater range of expansion, the steam consumption is expected to be still lower. With an evaporation of only 14 lb. of water per lb. of oil, we have thus the probability of consumption equal to 0·8 lb. of oil per S.H.P. per hour. A British firm, with a great experience of marine oil-engines, claims an economy in oil-engines over coal-fired boilers and steam-engines of 30 per cent. in fuel consumption. Thus, if the price of coal used is not more than 70 per cent. the price of oil —and it is at nearly all ports much lower—the financial result cannot be in favour of the oil fuel.

Oil engines for sailing ships.

As an auxiliary propelling agent in a sailing ship, the oil-engine is on a different plane. It has everything to commend it, because it can be started up and put out of action more easily than any other prime mover, and its economy is therefore the greater; indeed, it is surprising that the system is not now extensively adopted on existing ships. A 2000-ton sailing ship on the Australian trade takes eighty days on the voyage, ten to twelve of which might be saved were a small engine, of from 200 to 500 H.P., fitted to propel the ship in calm weather, while capstans, sail and cargo gear, etc., could be worked by electricity generated by the same motor. Not only would there be a great addition to the gross earning power of the ship per annum, but towage charges would be saved, insurance rates reduced, and the wage bill lowered.

Weight of oil engine and turbine machinery.

In the Navy, however, as well as in the Merchant Service, other considerations than economy in fuel are operative; the space occupied and the weight saved are important factors. A reduction in the one case renders increased offensive or defensive powers or greater speed possible, and, in the other instance, enables more cargo and therefore a higher revenue to be earned on a ship of the same dimensions. The Nurnberg Co. state that the weight and space saved in the Hamburg steamers is "about 40 to 50 per cent. of that of a steam-engine plant of the same power." They state further that in their light weight engines, specially designed for Navy purposes, "we succeed in reducing the weight per B.H.P. of the larger engines to 35 lb., and of the smaller engines to about 40 lb., including all auxiliary machinery and apparatus, such as water and oil pumps, fuel pumps, air pumps, coolers and filters for air, oil and water, and the entire reversing

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apparatus with compressed air receivers. . . ." The shafts are, no doubt, also included. The power is not given. The 35 lb. works out at 64 B.H.P. per ton. The British firm with large experience already referred to is content to claim a reduction of 15 to 20 per cent. in total weight. Engineer Vice-Admiral Sir Henry Oram, K.C.B., the Engineer-in-Chief of the British Navy, states that the steam turbine installations of our later ships give, everything included, equal to 13 to 14 S.H.P. per ton. He says that "as regards oil-engines, it is no doubt correct that about 17 S.H.P. per ton of machinery can be obtained, with special designs, using heavy oil. Each engine, however, is small, and its power cannot be increased very much without decreasing revolutions and increasing the weight for a given horse-power, so that the very large powers required for marine propulsion could only be obtained by multiplication of small units."

Space occupied by our engines and turbines.

As regards space, it has been stated, according to Sir Henry Oram, that about 0·32 sq. ft. of floor space per B.H.P. would be required for oil-engines in a large installation. The corresponding figure in a large turbine installation is 0·28 sq. ft., and this figure would decrease as the power of the turbine installation increased. The Nurnberg Co., it will be noted, claim a gain in the Hamburg ships of 40 to 50 per cent., the British firm, already quoted, 25 to 30 per cent. No doubt later experience and the request for definite oil-machinery plans for warships from the British firm, and from other firms in this country, will shed light on the practical results as regards weight and space, and also as to economy.

Cost of manufacturing oil engines and turbines.

Information as to comparative costs of manufacture is meagre. An enquiry for a small Diesel engine brought a tender quoting about £10 per B.H.P., without the air compressors. As complete installations of steam turbine plant, including boilers, auxiliaries and shafting, for our warships cost less than £10 per S.H.P., it can scarcely be considered that propelling machinery on the oil principle will, at all events for a long time, cost less than turbine plant, although costs must decrease with experience and practice.

Probable improvements in turbines.

The turbine, satisfactory as it now is, has not by any means reached its highest efficiency or lowest cost. There have been important developments in the former respect during the past twelve months. Several Powers, as well as Britain, are seeking knowledge as to the working results of various types. In the 25-knot scout cruisers of 4230 to 4280 tons displacement Germany is trying alternative systems. The Parsons type has done exceptionally well in several of these vessels, and is being fitted to the Augsburg, while the Schichau turbine is being put into the Kolberg and the Ersatz

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Bussard, the Zoelly turbine to the Cöln, and the Allgemeine Electricitats Gesellschaft turbine, which is based on the Curtis turbine, is in the Mainz. For the present, however, practically all the large ships have the Parsons installation. This latter fact applies also to the large ships for France, Italy, Austria, Russia, and other Powers.

Turbines for cruising speeds.

The developments in progress here and on the Continent are in the direction of attaining the same high economy at low powers as at full power. For many years all warships were fitted with an extra high-pressure turbine for use only when cruising at low powers. This gave a considerably greater range of expansion. It was cut out at higher speeds, the steam from the boiler then passing direct to the high-pressure turbine of the main set of engines. More recently this extra turbine has been discarded, and the main high-pressure turbine has been extended at the steam end by increasing the number of stages of the smaller blading, so that when it is desired to run at low fractions of the full power, the full pressure drop of the steam may be utilised. At high powers, the steam from the boilers is admitted through a bye-pass valve at an intermediate stage. This has given improved results, but at less than half power the steam has still to be throttled at the point of admission, and although this practice tends to dryness of steam it cannot be regarded as equal in result to the maintaining of full pressure at all powers. In disc turbines of the Curtis, Brown-Curtis, A.E.G., and other types, the steam passes through nozzles impinging on the blades of wheels on the rotor; and it is thus possible to vary the weight of steam admitted by merely closing nozzles according to the proportion of full power to be developed. The blading in such cases imparts a turning moment to the rotor by impulse, and not by reaction, as with the Parsons turbine. At the same time, the turbines embody the principle of velocity compounding, and by this means it is possible to expand the steam reasonably efficiently, in spite of its high velocity of efflux, before passing it through other nozzles to succeeding bladed wheels on the rotor. But, as explained in previous issues of the *Naval Annual*, the construction of turbines with wheels alternating with diaphragms, having guide blades, did not commend itself to all engineers. Messrs. John Brown & Co., Ltd., Clydebank, when they took up the Curtis turbine, decided, after experiment,* to adopt the more widely approved drum construction for the rotor, while retaining a few velocity compounded wheels and using impulse blading on the drum of the rotor. Such a Brown-Curtis turbine gave satisfactory results on the steam trials of H.M.S. Bristol,

The Brown-Curtis turbine.

* See *Engineering*, September 30, 1910.

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as referred to in another part of this issue of the *Naval Annual*. The same type is being fitted in H.M.S. Weymouth and in several torpedo-boat destroyers for the British Navy.

Parsons impulse reaction turbine.

For some time the Parsons Co. have been designing and manufacturing combination turbines for land stations and for foreign warships, having one impulse stage at the high-pressure end, without velocity compounding, and with the ordinary re-action blading on the remainder of the high-pressure turbine. The low-pressure turbine may be of the same design or completely of the re-action type. The astern turbines follow the same principle. The impulse wheel is mounted upon, or forms part of, the drum of the rotor, so that the objections some entertain to alternate wheels and diaphragms is overcome, while the advantage of the nozzle system of variable steam admission is obtained. Two of the British twin-screw torpedo-boat destroyers, now being built by Messrs. Thornycroft of Southampton, are to be fitted with such Parsons impulse-reaction turbines, which have given economical results in land stations and on the Continent. Thus it will be seen that the attainment of low consumption, at small as well as great powers, is possible. This point is of great importance, since from the figures already given of the performance of the Dutch Co.'s Deisel oil engine it will be seen that the consumption at quarter power is about double that at full power.

Parsons' turbines and gearing.

There are also great possibilities in the use of helical gearing in warships. The steam loss in turbines running at low speeds is due to leakage past the clearances between the moving blades and the casing, and between the guide blades and the rotor. This leakage is practically constant, irrespective of the speed of rotation, and is specially great with the short blades at the high-pressure end of the system. At low speeds the loss, relative to the total steam used, is high. In order that this loss may be reduced, a new arrangement is being tried. Helical gearing is now being fitted by the Parsons Company between a high-pressure and a low-pressure turbine on each shaft in twin-screw torpedo-boat destroyers. The high-pressure turbine at all speeds will run at a rate of revolution conducive to economy, being designed for the maximum blade efficiency, and with a high initial steam pressure. This will lead to increased economy at all speeds, and to higher economy at low powers, especially when suitable "cruising" stages are fitted. These turbines, which may be in series on the twin shafts, work, through the helical gearing, the same shaft as the low-pressure and astern turbines, the difference in revolutions between the high and low pressure turbines being accommodated by the gearing. The result of this application will

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excite considerable interest. It is suitable not only for destroyers, but for all ships, although specially adaptable for the smaller vessels where twin-screws are preferred.

Efficiency on geared turbines.

The efficiency of helical gearing was established by tests in a specially constructed 22-ft. launch, and later in a cargo steamer, the Vespasian. This steamer, 275 ft. long and of 4350 tons displacement, had previously triple-expansion reciprocating engines, which were removed and replaced by a high and a low pressure ahead turbine, fitted with gearing to let the propeller run at one-twentieth of the revolutions of the turbines. No other change was made, and it was demonstrated that at the continuous sea speed of the ship the consumption was 13½ per cent. less with the turbines than with the reciprocating engines, with a great saving in oil and less tear and wear. Last year the vessel steamed in service over 12,000 miles with most satisfactory results. This suggests that there is still a great field for the turbine in cargo ships.

Exhaust steam turbines.

Again, Parsons' low-pressure turbine has proved admirably suited for utilising the work remaining in steam after it exhausts from reciprocating engines at about 8 lb. or 10 lb. pressure absolute. The combination of a turbine on a centre shaft with two reciprocating engines on the outer shafts has reduced the total consumption of large steamers by 14 to 18 per cent. These economies on large ocean-going steamers, driven by geared turbines only or by combined reciprocating engines and turbines, make it the more difficult for oil engines to displace the turbine in the future.

Advantages of oil fuel.

The use of oil confers great advantages in respect of loading and stowage of fuel. Oil can be carried in parts of the merchant ship of little use for cargo and in parts of warships of no value for storing supplies of any other kind. The gain in merchant shipping in increasing the capacity for cargo will add greatly to revenue. Moreover, the loading of fuel and the trimming of it are greatly simplified. All these advantages, however, can be realised if oil be used for firing the boilers. The mechanism for spraying the liquid fuel is now perfect, and the number of men required reduced to a minimum. Mr. Andrew Laing, of the Wallsend Slipway and Engineering Company, who have done much in the fitting of oil-burning boilers, has given the writer figures which show that including all charges, wages, victualling, repairs, etc., the cost of burning oil is 4*d.* per ton, and of burning coal 2*s.* 6*d.* These results are from ships of about equal horse-power, 300 tons of coal being burned per day in the one case and 200 tons of oil in the other. And yet oil is now only used as boiler fuel in such vessels as visit oil-producing countries in the course of their regular service, and can therefore get oil at relatively

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low prices. This must also affect any preference for the oil engine over the steam engine in the immediate future.

Disadvantages of oil reciprocating engines.

In any discussion of the oil or coal-gas engine, the subjects of unbalanced forces, torque on the shaft and vibration, cannot be ignored even in merchant ships. In warships they are of primary importance, since steadiness of gun platform in a running fight may alone suffice to make the difference between victory and defeat. The only vibration with turbine machinery is due to the propeller, and where the screws are far removed from the ship's skin—a condition also conducive to propeller efficiency—the vibration is practically negligible. In a strongly braced structure like our armoured ships, the screw vibration does not affect the gun-control positions nor the gun-laying work. This comparative freedom from vibration is due to there being a constant torque on the shaft, and an entire absence of unbalanced forces. The bearings practically do not wear, while the structure of the ship in the machinery compartment is not subjected to excessive stresses. Indeed, turbines on land need have no foundations. All the troubles of the past—due to blade-stripping, distortion of casings, etc.—have been overcome by "fining" the ends of the blades to a sharp edge, and by care in proportioning the thickness of casings and their strengthening ribs throughout and especially at the inlet and exhaust ports, so as to ensure uniformity in expansions due to heat.

Vibration.

With the oil or coal-gas engine unbalanced forces are enormously greater than those in the steam-engine, and are of themselves sufficient to induce Naval engineers to prefer the turbine. The impelling force is entirely downwards, except in the double-acting engine, and is more sudden in its action than with steam. It is true that the maximum impulse is only for a small fraction of the stroke, but it must have its effect on the working parts. Some fear a crystallising of the metal from what they consider to be almost a hammer blow, but in any event the punishment must be severe. For this reason the working parts, including, of course, the crank and shafts, must be of enormously greater strength, and with high-power steam reciprocating engines they had already reached proportions making truly homogenous metal expensive to get. Multiple cylinders will greatly improve the turning moment and make the torque more uniform in internal combustion engines, but it can never be so satisfactory as with the turbine. Again, in large volume cylinders the alternations of very high temperatures, due to combustion, with low ones due to water cooling, will involve great variations in expansion and contraction of all parts, including pistons and valves and, in the case of double-acting cylinders, of piston rods and glands also.

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The hope of the oil turbine.

There remains the hope of the coal-gas or oil turbine, but so far the results of many costly experiments have practically been wholly negative. The turbine is efficient when fed with gas of low density, but a gas-turbine cannot in practice exhaust below atmospheric pressure, in which case its efficiency ratio will, as a maximum, hardly reach 65 per cent. By making use of a regenerator to recover the waste heat from the exhaust and warm up the incoming air, a fairly good case can be made out on paper for the gas-turbine, provided always that a really efficient compressor is obtainable. This, however, is the point at which all the experiments hitherto made have proved disappointing; and that the prospects of the gas-turbine are not bright, even were this difficulty overcome, seems to follow from the results of applying the gas-turbine to torpedo propulsion. Here the air supply is provided already compressed, and the only demand made on the turbine is that it shall efficiently use this store, which passes first to a combustion chamber, where it unites with the oil fuel, and thence on through the turbine. The conditions, therefore, are such as to give the latter an excellent opportunity of displaying its capabilities unhampered by the necessity of providing its own supply of compressed air; but actual experiment has shown that the results obtained are substantially less favourable than with the reciprocating engines, which have long constituted the standard torpedo drive.

The higher over-all efficiency of coal-gas or oil engines or turbines will certainly prove alluring, and if the world's production of oil should increase, and the price be reduced in the immediate future, the engineer will be stimulated to overcome the difficulties. Many of them, as already shown, will disappear with greater practical experience for guidance in design, with the use of superior metals for the highly stressed units, and with great care in the manufacture. Each new departure has made exactions upon the engineer in all of these directions. The immense progress made, even in recent years, shows that the engineer has responded with energy, courage and ingenuity. Thus there is every hope for the future.

ALEX. RICHARDSON.

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CHAPTER VI.

The Tactics of Trafalgar.

In his brilliant and masterly work on "The Campaign of Trafalgar," Mr. Julian Corbett has brought all his erudition and acumen to bear on the much vexed question of how Nelson's last battle was fought. As I am about to subject his arguments and conclusions to a close critical examination, I desire to acknowledge, without reserve, the immense service he has rendered to the study and understanding of naval history by his searching analysis and luminous exposition of the whole campaign of which Trafalgar was the ever-memorable close. He has settled once for all the main lines on which all study of the campaign must proceed, and though some of his appreciations and conclusions may be disputed, yet I cannot doubt that his work as a whole will always be regarded by serious students of naval history as one of the classics of their subject.

At the same time, I think I can show that Mr. Corbett's reading of the tactics of Trafalgar is in many respects open to grave question, and in some incompatible with the recorded and indisputable facts of the case. I could wish that the task of doing this might have fallen into more competent hands than mine; but, if I am right, it is very important that the task should be undertaken by someone. As a lecturer at the Royal Naval War College, Mr. Corbett exercises—and in my opinion justly exercises—a vast influence over the mind and thought of the sea-service, and it is, therefore, of the utmost moment that the influence he exercises should be a sound influence, an influence justified by teaching at once unimpeachable in its methods and unassailable in its conclusions. I shall show—or, at least, I think I shall show—that Mr. Corbett's handling of the tactics of Trafalgar fails at many points to satisfy these conditions.

The problem can be very easily stated, but its solution is, nevertheless, a matter of extreme difficulty and complexity. Was the battle fought in accordance with the plan prescribed by Nelson, or was it not? We know exactly how Nelson intended to fight the battle, because he embodied his intentions in a written Memorandum communicated to all the flag-officers and captains under his

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command, and he personally expounded this Memorandum—which he called "The Nelson Touch"—to these self-same officers assembled on board the Victory. He has himself recorded the result of this explanation: "When I came to explain the 'Nelson Touch,' it was like an electric shock. Some shed tears; all approved. It was new—it was singular—it was simple! And from admirals downward it was repeated, 'It must succeed, if ever they will allow us to get at them!'"

Now there is no doubt about the text of this famous Memorandum. A copy of it in Nelson's own handwriting is now in the British Museum. Another copy of it, delivered to Captain Hope, of the Defence, was endorsed as follows: "It was agreeable to these instructions that Lord Nelson attacked the combined fleets of France and Spain off Cape Trafalgar, on the 21st of October, 1805." On the other hand, there is just as little doubt that the attack, as actually made, was not made in exact conformity with the prescriptions of the Memorandum. "Something must be left to chance," wrote Nelson himself; "nothing is sure in a sea-fight, beyond all others." And in writing to Collingwood, enclosing a copy of the Memorandum, he said, "I send you my plan of attack as far as a man may dare venture to guess at the very uncertain position the enemy be found in." The Memorandum opened with a distinct and emphatic repudiation of the traditional "Line of Battle," which Nelson discarded because he held its formation to involve "such a loss of time that the opportunity would probably be lost of bringing the enemy to battle in such a manner as to make the business decisive. I have therefore," he continues, "made up my mind to keep the fleet in that position of sailing (with the exception of the First and Second in Command), that the Order of Sailing is to be the Order of Battle, placing the fleet in two lines of sixteen ships each, with an advanced squadron of eight of the fastest sailing two-decked ships, which will always make, if wanted, a Line of twenty-four sail on which ever Line the Commander-in-Chief may direct."

Here, for the first time, the order of sailing was to be the order of battle. In other words, the attack was to be made in two lines or more, and not in one. The order of sailing was the prescribed order in which a fleet was disposed in two or more divisions for cruising and other evolutionary purposes, and it was a permanent order not frequently changed, the position of the ships in the several divisions being generally determined by the seniority of their captains. Unfortunately, we have no certain and authentic record of the last order of sailing issued by Nelson before Trafalgar, but I am informed by Admiral Sir Cyprian Bridge that, if the order had been determined

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by the seniority of the captains, it would, with one exception, have stood as follows:—

Weather Line.	Lee Line.
1. Victory (Flag), 100.	1. Royal Sovereign (Flag), 100.
2. Temeraire, 98.	2. Prince, 98.
3. Neptune, 98.	3. Tonnant, 80.
4. Conqueror, 74.	4. Belleisle, 74.
5. Leviathan, 74.	5. Mars, 74.
6. Africa, 64.	6. Colossus, 74.
	7. Achille, 74.
7. Britannia (Flag), 100.	8. Bellerophon, 74.
8. Spartiate, 74.	
9. Ajax, 74.	9. Dreadnought, 98.
10. Minotaur, 74.	10. Thunderer, 74.
11. Orion, 74.	11. Revenge, 74.
12. Agamemnon, 64.	12. Defiance, 74.
	13. Defence, 74.
	14. Swiftsure, 74.
	15. Polyphemus, 64.

The position of the Dreadnought is uncertain. She had only just ceased to be Collingwood's flagship when he transferred his flag to the Royal Sovereign, and, being a bad sailer, she was ordered on the day of battle to take station as convenient. It seems clear from the records that her position was not at the extreme rear of the lee line, as it would have been had it been determined by the seniority of her captain. The last order of sailing known to have been issued by Nelson before the battle was that of October 10, but it cannot have been the order actually employed at the battle, because it was based on the assumption that the Fleet would consist of forty ships, including Louis's squadron, which was at Gibraltar on the day of battle, and several other ships which Nelson expected to join. But taking this order as the basis, and modifying it in accordance with the actual facts, Mr. Corbett gives the following as the—

PROBABLE ORDER OF BATTLE AT TRAFALGAR.

Van or Weather Squadron.	Rear or Lee Squadron.
1. Temeraire.	1. Prince.
2. Victory.	2. Mars.
3. Neptune.	3. Royal Sovereign.
4. Conqueror.	4. Tonnant.
5. Leviathan.	5. Belleisle.
6. Africa.	6. Bellerophon.
	7. Colossus.
7. Britannia.	8. Achille.
8. Ajax.	
9. Orion.	9. Dreadnought.
10. Agamemnon.	10. Polyphemus.
11. Minotaur.	11. Revenge.
12. Spartiate.	12. Swiftsure.
	13. Defence.
	14. Thunderer.
	15. Defiance.

I have given these two orders in full, because a very important

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issue depends on a comparison between them. The first gives what the order would have been had the ships been disposed—Dreadnought excepted—according to the seniority of their captains; the second what Mr. Corbett believes to have been the order intended by Nelson for the battle. It is certain, however, that the Prince did not lead the lee line, because, being one of the worst sailers in the Fleet, she could not keep or even reach her station, and was the last ship to get into action. She was one of the ships which, with the Dreadnought, was ordered to take station as convenient. Several other orders have been given by different authorities, some of them contemporary. I have indicated four of them in my "Nelson and other Naval Studies," p. 46. Mr. Corbett says of them that "no two of them agree, none have any certain authority, and all are demonstrably incorrect in detail." I will only here remark that it is equally true to say of Mr. Corbett's "Probable Order" that it has no certain authority; but the important point to note is that there is no serious dispute as to the ships which were disposed at the head of the lines. With exceptions, which can be accounted for, these were the ships commanded by the senior captains of the Fleet. Whether for that reason they were some of the heaviest ships in the Fleet, or whether these same ships were disposed at the head of the lines for tactical reasons, irrespective of the seniority of their captains, is a question which cannot now be determined with any certainty. On the one hand, Admiral Bridge says, in his "Sea-Power and other Studies," p. 274, that "there is not, I believe, in the whole record of Nelson's opinions and actions a single expression tending to show that tactical efficiency was considered by him to be due to size of individual ships of the same class, or, as far as *matériel* is concerned, to anything but superior numbers, of course, at the critical point. . . . What he wanted was to bring to the point of impact when the fight began a larger number of ships than was to be found in that part of the enemy's line." On the other hand, Mr. Corbett finds, or believes himself to find, in Nelson's order of battle a tactical intention—borrowed from the great French tactician, Bigot de Morogues—of the utmost moment and novelty:—

> He would arm the head of his line for the fatal shock with a mass of fire that nothing could resist, and would overpower the time-honoured defensive formation by sheer weight of metal and momentum. He would form his van of a group so powerful that, even if it were cut off and surrounded, it could hold its own against any concentration that could be brought to bear upon it. Thus it was that at the supreme crisis he called to his aid the theory of the great French tactician—the theory of the concentration of gun-power in the fewest possible units and in the shortest possible length of line. And so in the culminating hour of sailing warfare the theorist and the man of action were at one.

Were they? According to Admiral Bridge there is no scrap of

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evidence of it, nor do I know of any myself, unless it be the preference for big ships afterwards avowed by Hardy, Nelson's flag-captain at Trafalgar. It is true that Mr. Corbett holds that "the idea of massing heavy ships in the van is to be detected in the two orders of battle which Nelson issued during his chase of Villeneuve." But he adds, candidly enough, that "in both cases the arrangement may have been accidental or due to other considerations," and I have shown that such other considerations may have been, and probably were, considerations of seniority. Why, having admitted this much, Mr. Corbett should go on to say that "the Trafalgar order places it beyond doubt that Morogues' suggestion was the fundamental idea on which Nelson disposed his ships," I am quite unable to understand.

There is, moreover, nothing in the Memorandum to show that if Nelson attacked from to windward, as he avowedly intended to do if he could, the tactical purpose attributed to him by Mr. Corbett could have afforded him any advantage or could even have been carried into effect. Collingwood's attack with the lee line was unquestionably intended by Nelson to be an attack in line abreast, all the ships breaking the enemy's line so far as possible simultaneously, so that the heavy ships, whether at the head of the line or anywhere else in it, would enjoy all such advantages as belonged to them, and neither their superior weight of metal nor their superior momentum would be more irresistible in one part of the line than another. Moreover as to his own method of attack with the weather line, Nelson gave in the Memorandum no indication of what it was to be. It was to depend on circumstances and on the fortunes of the lee line. All that he said was "the remainder of the enemy's fleet . . . are to be left to the management of the Commander-in-Chief, who will endeavour to take care that the movements of the Second in Command are as little interrupted as possible." He did not say, because he could not tell beforehand, whether his own line would attack in line ahead or in line abreast, and it is obvious that unless his plain intention was to attack in line ahead it would be no more use for him than it was for Collingwood "to arm the head of the line for the fatal shock with a mass of fire that nothing could resist." It does not matter in the least at this point how he did actually attack in the end. In order to justify Mr. Corbett's hypothesis, we must assume that it was his plain intention from the outset to attack in such a fashion as to secure the full advantage of having placed his heaviest ships at the head of his line, and of any such intention there is no trace whatever in the text of the Memorandum. What he had to do was, as he said himself, to take care that Collingwood's movements were as little interrupted as possible. This he did by concentrating

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on the centre of the enemy's line and thereby throwing the van out of action. None of the ships in his line—except the Africa, which was out of her station—attacked any of the ships in the enemy's line ahead of the Santisima Trinidad, though they fired at one or two ahead of her in passing. Between that ship and the Santa Ana, the leading ship of that portion of the enemy's line which was attacked by Collingwood, there were only six of the enemy's line to be attacked. These were, according to the order of battle given by Colonel Desbrière ("Trafalgar," Appendix, p. 124), Bucentaure, Redoutable, Neptune, Leandro, San Justo and Indomptable, the four last of which were, according to the same authority, to leeward. Nelson attacked these with eleven, subsequently supported by a twelfth, the Africa. Is it not plain, then, that Nelson so ordered his attack as to bring, as Admiral Bridge says, "to the point of impact, when the fight began, a larger number of ships than were to be found in that part of the enemy's line," and not, as Mr. Corbett argues, so as to take advantage of having "armed the head of his line with a mass of fire that nothing could resist," or "to overpower the time-honoured defensive formation by sheer weight of metal and momentum"? If the latter was his purpose it was certainly not fulfilled. The three ships at the head of Nelson's line were the Victory, 100 guns, the Temeraire, 98, and the Neptune, 98, mounting 296 guns in all. The three ships directly opposed to them were the Santisima Trinidad, 130, the Bucentaure, 80, and the Redoutable, 74, mounting 284 guns in all. Mr. Corbett tells us that "the enormous mass of gun-power at the head of Nelson's line dominated the counter-convergence of fire," and yet the "sheer weight of metal" which brought this about was represented by the trifling superiority of 296 guns against 284. As to the "sheer weight of momentum" which contributed to the same result, it suffices to point out that, even according to Mr. Corbett, Nelson altered course at least once while under fire and before passing under the stern of the Bucentaure—a proceeding which must have appreciably reduced the way of the Victory and lessened her momentum. Besides, as Mr. Corbett also tells us, "the wind had nearly dropped" at this time. In these circumstances the theory, which is supported by no scrap of documentary evidence, that Nelson relied, or ever intended to rely, on "sheer weight of metal and momentum" for the main stress of his attack must surely be regarded as untenable. That he relied on it, or ever intended to rely on it, for the main stress of Collingwood's attack is disallowed by the plain words of the Memorandum.

But to return to the Memorandum itself. Nelson prescribed, as we have seen, that the order of sailing was to be the order of battle, "with the exception of the first and second in command." In the

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order of sailing the flagships of these officers would lead their respective lines. But it was not Nelson's intention that they should occupy that position in the order of battle. Collingwood was to have been third in his line, and the Temeraire was to have led the weather line, and would have been followed by the Superb had that ship joined before the battle. As a matter of fact Nelson and Collingwood did lead their respective lines into battle, apparently because, when it came to the point, neither of these great fighters could bring himself to surrender his pride of place. I need not go more closely into this matter, because the reasons for this change in Nelson's intentions, whatever they were, do not seem to me materially to affect the question of how the attack was made, and it is only necessary to point out that this was one of the respects in which the actual mode of attack did, as a matter of fact, differ from the mode prescribed by the Memorandum. Another and rather more important respect in which it differed was that there was no advanced squadron in the actual order of battle. There were only two lines—the weather line, with 11 ships, the Africa being out of her station, and the lee line, with 15. Nelson in his Memorandum had reckoned upon having 40 ships in company. As he had only 27 he could not form an advanced squadron without unduly weakening the two lines on which the main burden of the attack was intended by him to fall. There had been an advanced or detached squadron during several days preceding the battle. But on the day of the battle, "it was"—as I have said in my "Nelson and other Naval Studies," p. 39—"broken up and distributed between the other two divisions. Nelson had apparently satisfied himself that the time had then already come for disposing of them, in accordance with the intentions indicated in the first paragraph of the Memorandum, not, indeed, in strengthening one division or the other, but in strengthening both, though in different proportions."

In these two respects, then—the position of the two principal flagships and the absorption of the proposed advanced squadron into the two main lines of the Fleet—there can be no doubt that the actual mode of attack differed from the textual prescriptions of the Memorandum; but I do not think it can be argued that the tactical purpose set forth in the Memorandum was materially affected by these differences. We have now to enquire whether there were any other differences which did materially affect Nelson's avowed tactical intention and design. Another general prescription of the Memorandum was that "the Second in Command will, after my intentions are made known to him, have the entire direction of his line to make the attack upon the enemy and to follow up the blow

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until they are captured or destroyed." This is repeated in one of the paragraphs of that part of the Memorandum which deals specifically with "the intended attack from to windward":—"The entire management of the lee line, after the intentions of the Commander-in-Chief are signified, is intended to be left to the judgment of the Admiral in command of that line." It has been a question whether these words imply that Collingwood's discretion was to be absolute from the time when the signal for the advance should be made, or whether Nelson reserved his own authority until such time during the advance as his final intentions might be signified by some specific signal. The words are in themselves ambiguous and might lend themselves to either interpretation. It is plain that Nelson could not abdicate his own authority unconditionally, and it is certain that he did exercise his authority over Collingwood's line during the advance by telling the Mars first to take station astern of the Royal Sovereign and a few minutes later to lead the lee line. But he did not tell Collingwood to facilitate this change of station by shortening sail in the Royal Sovereign, and for this reason the Mars could not carry out the injunction she had received. In the schedule of signals given by Mr. Corbett, pp. 455–463, there is no other signal addressed specifically to Collingwood or to any ship in his line, except a second one repeating the order to Mars to lead the lee line. She then made all sail for the purpose of doing so, but as Collingwood did not shorten sail she failed to get ahead of him. Thus it would seem that, save at the very outset of the advance, Nelson made no signals of what would now be described as a "forming and disposing" character to the lee line, except those already cited as addressed to Mars. On the other hand, Collingwood did make several forming and disposing signals to his own line, and these I shall consider presently. It would seem to follow that the entire direction of his own line was left to Collingwood from a very early stage of the advance. This conclusion is fully borne out by what Collingwood says himself. In his official despatch, written on the day after the battle, he says: "As the mode of our attack had been previously determined on and communicated to the Flag-officers and Captains, few signals were necessary, and none were made except to direct close order as the lines bore down." By the word "none" it must, I think, be assumed that Collingwood here meant "none of a forming and disposing character"—that is, none having the effect of making any material change in "the mode of attack previously determined on." In his comment on this passage Mr. Corbett remarks: "And yet it is certain many were made." The word "many" is, I think, an exaggeration. Anyone who has seen a large fleet in the process

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of being marshalled in a prescribed order and organisation will know that it usually takes a great many more signals to effect this purpose than are to be found in the schedule of signals given by Mr. Corbett. If these latter signals are analysed, it will be found that none of them, with the exception of those already mentioned and considered, are general signals of a forming and disposing character. Collingwood says that no such signals were made, and he did not expect any to be made. It is even recorded that when the memorable signal, "England expects that every man will do his duty," was being hoisted, and before its purport had been reported to him, Collingwood exclaimed with some impatience: "I wish Nelson would stop signalling. We all know what we have to do." This clearly shows that at that moment Collingwood believed himself to be carrying out the prescriptions of the Memorandum and to be entrusted for that purpose with the entire direction of his line. Again, two months afterwards, Collingwood wrote in a private letter to Sir Thomas Pasley: "Lord Nelson determined to substitute for exact order an impetuous attack in two distinct bodies. The weather line he commanded, and *left the lee line totally to my direction.* He had assigned the points to be attacked." On this Mr. Corbett remarks that "no one will assert that this is an adequate summary of the Memorandum." It certainly is not, but, on the other hand, no one is likely to assert that it refers to anything but the Memorandum, and, in any case, whether an adequate summary or not, it leaves no doubt that Collingwood held that the entire direction of his own line had been entrusted to him from the very outset of the advance.

The Memorandum next proceeds to explain at some length how Nelson proposed to attack "if the enemy should be seen to windward in line of battle." But as the enemy was to leeward when first sighted on the morning of the battle, this part of the Memorandum need not detain us. There are a few more general prescriptions in it, but they do not materially affect the particular issues with which I am concerned. I pass on therefore to the final section of the Memorandum, which deals with what Nelson calls "the intended attack from to windward, the enemy in line of battle ready to receive an attack." * This "intended attack" Nelson describes as follows:—

The divisions of the British fleet will be brought nearly within gunshot of the enemy's centre. The signal will most probably then be made for the lee line to bear up together, to set all their sails, even steering sails, in order to get as quickly as

* In the text of the Memorandum given by Mr. Corbett in "Fighting Instructions," p. 318, and again in the same text given in an Appendix to "The Campaign of Trafalgar," p. 449, as well as in one or two passages where Mr. Corbett cites the Memorandum in his own text in the latter work, the words above quoted are given as "the enemy in line of battle ready to attack," the words "receive an" being romitted before "attack." This is, of course, merely a clerical error, though its epetition is rather surprising. It is important to correct it because it makes Nelson

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possible to the enemy's line, and to cut through, beginning from the twelve ships from the enemy's rear. Some ships may not get through their exact place, but they will always be at hand to assist their friends; and if they are thrown round the rear of the enemy, they will effectually complete the business of twelve sail of the enemy. Should the enemy wear together, or bear up and sail large, still the twelve ships composing, in the first position, the enemy's rear are to be the object of the attack of the lee line, unless otherwise directed by the Commander-in-Chief, which is scarcely to be expected, as the entire management of the lee line, after the intentions of the Commander-in-Chief are signified, is intended to be left to the judgment of the Admiral commanding that line.

Then follows the final paragraph, already quoted, concerning the function which Nelson assigned to his own division. He intended to "manage" the whole of "the remainder of the enemy's fleet," and he would "endeavour to take care that the movements of the Second in Command are as little interrupted as is possible." But he said no single word as to how he intended to do this. He did not know, and he could not tell, until the attack of the lee line was developed, and until he saw what, if any, steps the Commander-in-Chief of the enemy's fleet might take to parry that attack. I shall show, in the sequel, that he changed his mind and intention at least once during the later stages of the advance.

Nothing could be plainer than these prescriptions, nothing more explicit. There is no ambiguity about them and no uncertainty, except as to Nelson's own final intentions, and that, as I have shown, was inherent in the nature of his plan. Nor is there any room for doubt that Collingwood held that he had given effect to them. "We all know what we have to do," he said. Writing to his friend Blackett, on November 2, he said, "In this affair he (Nelson) did nothing without my counsel; we made our line of battle together and *concerted the mode of attack*, which was put in execution in the most admirable style." Surely this testimony is decisive. It is corroborated by Harvey, of the Temeraire, who wrote: "It was noon before the action commenced, which was done according to the instructions given us by Lord Nelson." On this Mr. Corbett remarks: "Whether by 'the instructions' he meant the written 'Plan of Attack,' or the verbal instructions passed down the line during the approach, every one must judge for himself. It is certainly impossible to assert beyond the possibility of contradiction that he meant the 'Plan of Attack.'" This criticism appears to me to be supremely paradoxical. It would require much ingenuity and even some perversity to sustain it, even if Harvey's testimony stood alone. But Collingwood's testimony is identical with that of Harvey, and Collingwood, at any rate, can have had no knowledge of "the verbal

write nonsense. A fleet in line of battle could not be "ready to attack" another fleet advancing from to windward, though it might be, and probably would be, if found in that position, "ready to receive an attack." But a close-hauled line could not move to windward at all without previously tacking.

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instructions passed down the line during the approach." I have already cited Hope's testimony to the same effect. Hope commanded the Defence, which was in Collingwood's line, and therefore Hope can have known as little of the verbal instructions in question as Collingwood did himself. Besides, Hope's testimony applies to the written plan of attack, and to nothing else.

"This," says Mr. Corbett, after citing the foregoing testimonies together with that of Codrington, "appears to exhaust the affirmative evidence, such as it is." Such as it is! Even if we waive the testimony of Harvey and Hope and Codrington altogether, what affirmative evidence could possibly be more convincing and decisive than that of such a man as Collingwood, the bosom friend of Nelson, his trusted Second in Command, the one man on whom rested the responsibility of carrying out the first phase of the attack in accordance with the prescriptions of his chief, the only man who could speak with authority at the end of the day as to how the battle was fought and how he led his own line into action? Nevertheless, Mr. Corbett would have us believe that "the negative testimony is richer and far more explicit." Let us see what it is. First, there is Moorsom, Captain of the Revenge, in Collingwood's line, who wrote shortly after the battle: "A regular plan was laid down by Lord Nelson before the action, but not acted upon." Moorsom's conception of the battle was as follows: "Admiral Collingwood dashed directly down, supported by such ships as could get up, and went directly through their line. Lord Nelson did the same, and the rest as fast as they could." This is not a very lucid tactical description; indeed, it is hardly too much to say that it scarcely affords any tactical information at all. Anyhow, Moorsom's own description lends little or no support to the theory that Collingwood's division made the attack in line ahead or in anything like it. Collingwood, he says, "dashed directly down," making, as Mr. Corbett interprets, "an almost perpendicular attack." But Moorsom also says that in dashing directly down Collingwood was supported by such ships as could get up, and this is hardly the way in which he would describe an almost perpendicular attack in line ahead. He himself, at any rate, was certainly not in what would have been his station in line ahead, nor anywhere near it. The Revenge was, according to his own account, "sixth ship in the rear of the column, but," he adds, ". . . Admiral Collingwood made my signal to keep a line of bearing from him, which made me one of the leading ships through the enemy's line." The signal in question was entered in the log of the Temeraire as having been made at 9.40 a.m. Its subsequent effect on the relative positions of the Revenge and the Royal Sovereign is recorded in the

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log of the former as follows: "At 12.25 Royal Sovereign commenced action in the centre. At 12.35 Revenge commenced in the rear." Thus Revenge was in action ten minutes after Royal Sovereign. She could not, therefore, have been in her station in line ahead as the ninth ship from the head of the line. It is true that Moorsom's son, Admiral Constantine Moorsom, who, as Mr. Corbett says, "earned himself a rare reputation as a scientific student of tactics," not only took the same view as his father, but went further. In his "Principles of Naval Tactics," published in 1843, he wrote that "there was an entire alteration both of the scientific principle and of the tactical movements." But long before 1843 the view which had been held by many from the very morrow of the battle, that Nelson's plan of attack was "not acted upon," had become stereotyped in the Service. Filial piety alone might have induced Constantine Moorsom to adopt a view which his father was one of the first to propound; and probably by the time he wrote any other view would have been regarded by the Service at large as wayward, eccentric, and far-fetched. In any case, the elder Moorsom's own account of the matter shows that he was rather puzzle-headed over it, and Constantine Moorsom's criticism, however clear-headed in itself, is at best only a proof of the views which prevailed at the time when he wrote, and no proof at all of what actually took place. To set either against the clear and authoritative testimony of Collingwood appears to me to be little short of preposterous.

Next we come to what Mr. Corbett describes as "the only fully reasoned criticism which we have from the pen of an officer who was present." This is the criticism of Admiral Sir Humphry Senhouse, who wrote it about 1820, and it was first published in an incomplete form in 1824 by Sir Charles Ekins in his "Naval Battles." It was afterwards published in full by Senhouse's daughter in *Macmillan's Magazine* for April, 1900, together with other illustrative documents from the same pen. Senhouse, says Mr. Corbett, was "an officer who highly distinguished himself in the later years of the war, and was afterwards flag-captain both in the Channel and the Mediterranean." At the Battle of Trafalgar he was a lieutenant of only three years' standing, and was serving in the Conqueror, commanded by Israel Pellew.* His testimony as an eye-witness is therefore of little

* Mr. Corbett says ("Campaign of Trafalgar," p. 344) that "Senhouse served at the battle in Israel Pellew's ship, the Colossus." This is, of course, only a clerical error for Conqueror; but it is an error which it is important to correct, because on p. 388 it is repeated in a context which involves a serious error of substance. Mr. Corbett there quotes "Senhouse, who was in the Colossus, the sixth ship of Collingwood's line," as bearing testimony to something which happened to Collingwood's line. But the Conqueror, in which Senhouse really was, was not in Collingwood's line at all. According to Mr. Corbett, she was the fourth ship in Nelson's line. Other authorities make her either the fifth or sixth in that line; but none put her in Collingwood's line.

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or no value. He can have known nothing at the time of Nelson's plan of attack. It is not certain that he was on deck at all during any part of the day, and it is certain that if he was on deck he must have been absorbed in duties which can have left him no time to attend to matters which did not concern him. But by the time he wrote his criticism he had become an accomplished and experienced staff officer, and therefore his criticism is entitled to respectful consideration, though it derives no additional weight from the fact that he was present at the battle, and may or may not have been an eye-witness of some of its incidents. I need not examine this criticism in detail. It suffices for my purpose to accept Mr. Corbett's summary of it:—

> His criticism was based on the then undisputed fact that the British Fleet bore up in succession and attacked in two lines ahead, and his argument is that it would have been better "if the regulated plan had been adhered to." "The attack of this almost infallible Admiral," he says, "was different from that laid down in his instructions, substituting a line ahead for a line abreast in his division," and he holds that the change sacrificed both simultaneous impact and superior concentration of attack. He assumes the form of engaging in two lines ahead end-on as a fact that no one present at the action would dispute, and indeed no one did.

By another clerical error there is a serious misquotation here. The word "division," as cited by Mr. Corbett, is "divisions" in Senhouse's Memorandum as printed in *Macmillan's Magazine*, vol. 81, p. 424. This shows that Senhouse believed, quite erroneously, that Nelson had prescribed an attack in line abreast for *both* divisions. He certainly prescribed it for the lee division, and if it can be shown that either Nelson or Collingwood substituted a line ahead for the line abreast in the lee division, then undoubtedly *cadit quæstio*. The Memorandum was thrown to the winds. But Collingwood's language lends no countenance whatever to this hypothesis, and I shall show in the sequel that the records equally disallow it. As to Nelson's division—the weather division—the Memorandum nowhere says how Nelson meant to dispose it for the attack, whether in line ahead or in line abreast. He reserved his unfettered discretion so to handle it as "to take care that the movements of the Second in Command are as little interrupted as is possible." Without further comment I would submit that if Senhouse did not take the trouble to ascertain what the Memorandum said and what it meant, he may have been equally careless and uncritical in ascertaining how the battle was actually fought.

I come now to two arguments which must be given in Mr. Corbett's own words. First:—

> Sir Charles Ekins, who had every opportunity of knowing, proceeds on the same assumption without a shadow of doubt. "It is known," he wrote, "to all the captains of the Fleet that the plan of attack from the windward was, by previous concert, to

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have been of a different and still more formidable nature." Indeed, it is believed that every categorical statement on the point by officers who were present or directly concerned—that is setting aside rough generalisations, and what is only inferential or an *obiter dictum*—asserts that the attack as delivered differed in important particulars from the plan of the Memorandum.

That it did differ in certain particulars is not to be disputed, but they were, as I have shown, neither important nor essential particulars. As to categorical statements by officers who were present or directly concerned there are none more categorical than those of Collingwood, and no officer who was present was half so directly concerned as he was. Why the endorsement of Captain Hope on his copy of the Memorandum should be dismissed as an *obiter dictum*, or the categorical statement of Captain Harvey as a rough generalisation, I am quite unable to understand. Even if all the officers present or directly concerned were in precisely the same tale, I should not regard their testimony as conclusive against the unimpeachable authority of Collingwood, and the documentary evidence corroborative of it which is furnished by records to which they had no access. It may sound paradoxical and even arrogant to contend that officers who were present did not know much more about the battle, and how it was fought, than anyone else can know now more than a hundred years after the event. But the difference is that we have access to the records, and they had not. On this point I can only repeat what I wrote when dealing with the same subject in "Nelson and other Naval Studies," p. 79:—

It is well known that when tactical exercises are being practised by modern fleets, no conclusions are formulated concerning their character and effects until the course and speed of each ship engaged, and its bearings from at least two other ships, recorded at short intervals by trained observers told off for the purpose, have been collated with similar observations concerning all other ships, and accurately plotted down on a diagram. Admirals themselves have told me that when this has been done they have often found not only that the effect of what they did themselves was quite other than what they had intended, but that they had attributed movements and dispositions to their opponents which the opponents themselves were shown never to have executed.

So much for the testimony of eye-witnesses uncontrolled by authentic records of what actually took place.

Secondly, says Mr. Corbett:—

For those accustomed to weigh historical evidence there cannot be serious doubt of what the departure was, in the deliberate judgment of the Naval Staff at the time. On this we have evidence that no inferential argument can shake, for it lies in the next edition of the Signal Book. There, beyond all dispute, is a new signal for a form of attack purporting, as the "Signification" explains, to embody the experiences of Trafalgar and the principles of the Memorandum. It is to "cut the enemy's line in order of sailing in two columns." It is accompanied by a diagram showing an almost vertical attack in two lines ahead without previous deployment, and a long instruction explaining the method of engaging in succession and its tactical advantages, such as they were, over simultaneous impact.

The judicious expert in the weighing of historical evidence will

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surely conclude from this statement nothing more than that what Mr. Corbett calls, rather proleptically, "the Naval Staff" of the time believed that a mode of attack, having for its object to "cut through the enemy's line in the order of sailing in two columns," was an embodiment of the principles of the Memorandum as well as of the experiences of Trafalgar. Whether or not it was an embodiment of the experiences of Trafalgar is precisely what we have still to ascertain; but that it was not an embodiment of the principles of the Memorandum is as certain as anything can be. On this point, at any rate, we may cite Senhouse and all those officers whom Mr. Corbett triumphantly marshals as asserting that "the attack as delivered differed in important particulars from the plan of the Memorandum," that, in fact, both lines "made an almost perpendicular attack—that is, the two lines went 'directly down' instead of getting into the designed position parallel to the enemy's line, and then hauling to the wind," though I should have thought that "and then bearing up" was what Mr. Corbett really meant, or ought to have meant. Thus, if the "Naval Staff" was right, then Senhouse and all the rest of them were wrong. They held, as Ekins tells us, that "the plan of attack from to windward was, by previous concert, to have been of a different and still more formidable nature." And yet here we have the "Naval Staff" throwing all their testimony to the winds, and prescribing a mode of attack which Nelson never meant to adopt and did not embody in the Memorandum, although according to them he did actually adopt it. Now, if the "Naval Staff" was mistaken, as it demonstrably was, in its appreciation of the principles of the Memorandum, may it not also have been mistaken in its interpretation of the experiences of Trafalgar? I think the judicious expert in the weighing of historical evidence must needs answer this question in the affirmative; and I am the more fortified in this opinion because I find that in "Fighting Instructions," pp. 339–342, Mr. Corbett, in citing and commenting on the signal under consideration, has expressed it himself in very emphatic terms. The signal, he says,

is an attempt to embody the teaching of Trafalgar, and the way it is done finally confirms the failure to understand what Nelson meant. . . . The final outcome of Nelson's genius for tactics lay, of course, in his Memorandum. . . . Yet this remarkable signal ignores the whole principle of the Memorandum. . . . It distorts Nelson's lee attack into a weather attack and holds up for imitation every vice of the reckless movement in spite of which Nelson had triumphed. . . . It is the last word of British sailing tactics, and surely nothing in their whole history, not even in the worst days of the old Fighting Instructions, so staggers us with its lack of tactical sense.

I would appeal, then, from Mr. Corbett in 1910 to Mr. Corbett in 1905, or, at least, I would ask him to tell us which of the two

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opinions he has enunciated is the one which those who are accustomed to weigh historical evidence are expected to adopt. It is true that his later comment shows, without express acknowledgment, that in his earlier comment he had in some respects misunderstood, and to that extent misrepresented, the signal in question. But in citing his earlier criticism I have omitted those portions of it which are based on this misunderstanding, and the fact remains that, apart from this misunderstanding, Mr. Corbett condemns the signal in very unmeasured terms. If in 1905 Mr. Corbett held that in "this remarkable signal" the Naval Staff "ignored the whole principle of the Memorandum," he can hardly appeal to it in 1910 to show that the Naval Staff understood how the battle was fought better than Collingwood himself. Or, if he does so appeal to it, he should surely have warned the readers of his later appreciation that he had diametrically altered his opinion of it. It will not suffice to say that his criticism of 1905 was based on a misconception which he has tacitly acknowledged in 1910. The principle of the signal is "to cut through the enemy's line in the order of sailing in two columns." That is not the principle of the Memorandum, nor anything like it. I need not labour this point. Mr. Corbett's words cited above leave no doubt about it. It is not to the signal book of 1816 that we must go for proof that Collingwood did not know how he led the weather line into action and did not mean what he said.

I will now consider, as briefly as possible, the course of events on the day of battle and Mr. Corbett's presentation of them. At daybreak on October 21, the British Fleet being in no regular formation, with a section of it detached, the wind being N.W. by N., backing to N.W. and very light and variable, the enemy's fleet was observed from the Victory in a direction E. by S. and at a distance of 10 or 12 miles. By 6 a.m. the wind was logged by the Victory as N.W., and so it remained, according to the same log, until 1 p.m., when it had backed to W.N.W. But it is certain that in other portions of the field of action the wind was more variable and in some positions it would seem to have backed slightly to the south of west. Be this as it may the following is a continuous quotation from the Master's log of the Victory: "At 6 observed the enemy E. by S., distance 10 or 12 miles. Bore up to the eastward. Out all reefs topsails. Set steering sails and royals. Cleared for quarters. At 8 light breezes and cloudy. Body of the enemy's fleet E. by S., 9 miles." The first signal that Nelson made was No. 72: "Form the order of sailing in two columns." This indicates that during the night the fleet had not been in the order of sailing, and it also ignores the "advanced

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squadron" altogether and once for all. A few minutes later a second signal was made, No. 76, with E.N.E. flags signifying: "To bear up and sail large on the course steered by the Admiral or that pointed out by signal," and almost simultaneously signal No. 13, "Prepare for battle," was made. Some forty minutes later signal 76 was repeated, this time with E. flags, so that Nelson, having first ordered an E.N.E. course, subsequently altered it to an E. course, as that best calculated at the outset to bring his two columns into the position indicated by the Memorandum. But from 8 a.m. onwards the master of the Victory logged the course of the ship as E. by N., presumably for some reason of navigation not recorded by him. These were all the general signals of a forming and disposing character recorded by Mr. Corbett in his schedule as having been made by Nelson until shortly before noon, when he made No. 307: "Make all sail possible with safety to the masts." Thus Collingwood was strictly accurate in saying in his official despatch: "Few signals were necessary, and none were made except to direct close order as the lines bore down." These words must refer to the very last general signal that Nelson made, which was No. 16: "Engage the enemy more closely." The making of No. 307 also implies that until it was made the ships addressed were not under all possible sail. Most, if not all of them, indeed, record that as soon as the signals to form the order of sailing and bear up were made they set studding sails and royals, but no general signal was made to this effect, although the Victory, as her log records, set the example; and it may be that the ships so acted in order to get as quickly as possible into their place in the lines and then afterwards shortened sail as necessary. Be this as it may, the British Fleet gradually drew into two irregular columns—"pelotons," as they were called by observers in the allied fleet—both steering about east, and both headed by their respective flagships. The enemy, when first observed, was bearing E. by S., and, as the allied line was on the starboard tack, it would be heading W.S.W. if the wind was at N.W., or from that to S.S.W., according as the wind was backing towards W. What further dispositions Nelson would have made for the purpose of bringing about the situation prescribed by the Memorandum, had the enemy continued on this tack and course, it is idle now even to attempt to conjecture; but the action of the enemy relieved him of the necessity for making any such dispositions, and his easterly course, sailing large on the port tack, was continued throughout the advance. The enemy's action was, in fact, determined by his own. No sooner was he seen to be bearing down from to windward in two "pelotons" than Villeneuve resolved to act in

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accordance with a special prescription contained in the French signal book. This signal ran as follows:—

L'armée de la République étant en bataille ou sur une ligne quelconque sous le vent, l'ennemi en peloton ou sur une ligne quelconque ou même sur plusieurs lignes cherchant à engager l'arrière-garde de l'armée, ordre à tous les vaisseaux de virer vent arrière tous à la fois.

According to a French official summary of the records of the allied fleet, given by Colonel Desbrière ("Trafalgar," Appendix, p. 284), this signal was hoisted at 8 a.m., and was in course of execution a quarter of an hour afterwards. Nelson, in his private diary, says: "At seven the enemy wearing in succession," and these were the last words relating to the action that he wrote. It is certain, however, that the enemy did not wear in succession, so that the words must not be taken in the strict technical sense, and it is equally certain that Nelson antedated the proceeding by at least an hour. Collingwood says in his journal: "At 10, their fleet wore, formed their line, and laid their heads to the northward; the British Fleet in two columns bearing down on them." The time here mentioned must, I think, be taken to be, not that at which the operation of wearing began, but that at which it was so far developed as to show clearly the direction in which the enemy was forming his new line. As to the wind, as affecting the enemy's movements and dispositions, we have this account of it in the official summary above cited:—

Le vent qui était au S.O. sauta au N.O. ou O.N.O.; il se fit sentir beaucoup plus tôt à la partie de l'armée qui devenait l'arrière-garde, qu'à celle qui devait former l'avant-garde; il en est résulté un engorgement considérable à l'avant-garde et au centre de la ligne. Les vaisseaux de l'arrière-garde ont été obligés de se tenir en panne pendant très longtemps.

Let us now consider what all this means. The course of the allied fleet on the starboard tack was between W.S.W. and S.S.W., according as the wind was at N.W. or more to the westward. At the moment of wearing it seems to have settled for a time at N.W., and to have been stronger in the neighbourhood of the new rear than in that of the new van. Hence, the new van, after wearing and steadying on the port tack, could not lie higher than N.E. or N.N.E., and could only advance very slowly in that direction.* For this reason

* Mr. Corbett has taken me to task for insisting (in "Nelson and other Naval Studies") on this direction of the enemy's van after wearing, and has little difficulty in showing that the wind was in fact very variable in different parts of the field of action. But although I may have insisted too strongly on the direction of the wind as recorded by the Victory's log, yet the essential thing after all is not the direction of the wind, but that of the enemy's van, and this is given in the Victory's log as follows:—"The enemy's line forming from N.N.E. to S.S.W." This again is corroborated almost beyond the possibility of dispute by Captain Prigny, Villeneuve's chief of the staff, who says (Desbrière, "Trafalgar," Appendix p. 142) "L'armée en bataille l'ordre renversé, ayant les amures à babord, ne présentait le cap qu'au N.N.E. et N.E. à cause du calme et de la grosse mer."

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Villeneuve repeatedly made signals to the van, not merely to haul to the wind, but to make more sail. Nor was this the only consequence of wearing in a light and variable wind with a line very irregularly formed. The operation must needs throw the new line into even greater confusion than the old, and leave many parts of it out of hand altogether. This effect is very apparent in the signals that were made to the allied fleet. Moreover, Mr. Corbett's idea that after the allied fleet wore "tous à la fois," it remained "motionless" until the attack was delivered, is disallowed by the very nature of the operation of wearing, and any signals or other records which seem to bear the sense claimed for them by Mr. Corbett must be interpreted in the light of this inherent impossibility. The ships would all turn to port simultaneously, and the rear ship, now become the van ship, would haul to the wind on the opposite tack, and thenceforth steer N.E. or N.N.E. But the succeeding ships, after wearing, would have to go free until they reached the point at which, by hauling their wind, they could form a close-hauled line astern of the leading ship. If each succeeding ship did not carry on in this way until the whole line was formed on the new tack, the operation would be absolutely impossible. Hence there could be no "motionless" ships in any part of the line except such ships as were compelled to remain motionless until the ships ahead of them could get out of their way. Still less could the whole line remain motionless, and that is why Villeneuve repeatedly signalled to his van to make more sail. It is true that each ship as she wore might haul to the wind, not astern of, but on the port quarter of her next ahead; but the effect of that would be to make a line of bearing, and not a line ahead, or as Villeneuve himself called it, a "ligne de bataille bien serrée."

There are other irrefragable proofs that the allied line was not motionless after wearing, that it was as a whole in continuous motion, with the exception of those ships which had to lie to—*rester en panne*—until the ships ahead of them could get out of their way. The log of the Victory contains the following entry: "At 8 light breezes and cloudy. Body of enemy's fleet E. by S., 9 miles. The enemy's line forming from N.N.E. to S.S.W." According to the same log the Victory was at that time steering E. by N. The situation thus indicated is shown in the annexed diagram, which I gave in my "Nelson and other Naval Studies," p. 53. It is drawn to compass and scale. V is the Victory, and the dotted line shows her course. B is the "body" of the enemy's fleet bearing E. by S. from the Victory, distant nine miles. E is the head of the enemy's line steering E.N.E. In the log of the Sirius we have a confirmation of these data. It runs: "At 8 . . Admiral S.W. by S. one mile. Centre of

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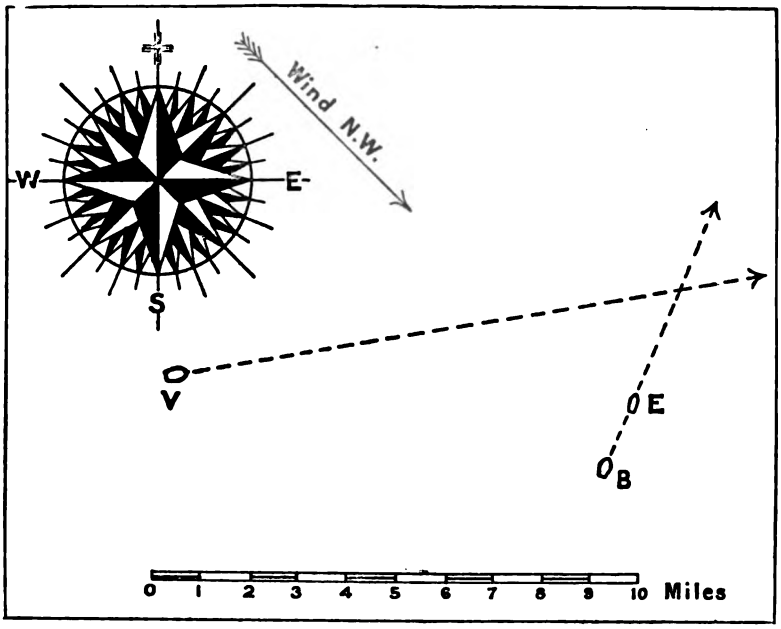
the enemy's fleet S.E. by E., four leagues." If these latter positions be plotted down to compass and scale, it will be found that they place the centre of the enemy's fleet much more to the southward than the log of the Victory does; but the difference may perhaps be accounted for by the fact that the Sirius was hove-to at the time, while the Victory was moving at the rate of three knots, and the allied fleet was also moving, though at less speed. Anyhow, unless the testimony of the Victory's log as displayed in the diagram can be overthrown, it is certain that the allied fleet must have been moving, because, had it been motionless, the course on which Nelson was



steering would have taken him some 2½ miles ahead of the van of the enemy's line. The diagram also disposes once for all of Mr. Corbett's truly astonishing theory that Nelson was steering throughout for the enemy's centre, or, as he puts it more explicitly in one passage, "for the fourteenth ship from the van." *

The sagging of the enemy's line to leeward, which was noted by nearly all observers, has been explained in various ways. Collingwood describes it as follows in his official despatch: "It formed a crescent convexing to leeward, so that in leading down to their centre I had both their van and rear abaft the beam." But Colling-

* "Campaign of Trafalgar," p. 373, n. The Victory's log has the following entry: "Still standing for the enemy's van."

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wood does not attempt to account for this formation, though he regards it as novel and intentional. "The structure of their line was new," he says. There is, however, nothing in the French records to show that it was intentional, and there is no doubt that it was both accidental and embarrassing to the allied Commander-in-Chief. But I need not here examine in any detail the several explanations that have been given. It must suffice to say that Villeneuve was attempting an almost impossible operation, that of wearing an ill-formed fleet of thirty-three sail together, and of forming a close-hauled line on the port tack in a wind that was light, variable, and baffling, and in a sea which was rough with a swell sweeping to leeward. According to Colonel Desbrière there is abundant testimony to show that Gravina's squadron of thirteen ships—originally told off to serve as an *escadre d'observation*—was, before the order to wear was given, disposed to windward of the original van of the allied fleet. After wearing, it would have to get into line astern of what had now become the rear, and being originally to windward, it would have to cover some distance before it could attain its assigned position. Its proceedings would be retarded by the delays occurring at the centre and head of the line, and these delays would themselves result in the ships affected by them drifting away to leeward, since a vessel hove-to with wind and sea both setting to leeward must needs be affected by their influence. The general result would be that if the course of the van was N.N.E., that of the rear, before hauling to the wind, might easily be E. by N. or even E. The undoubted drift to leeward of many of the ships in the allied line would further tend to accentuate the situation as described by Collingwood.

Now, if we consider this situation attentively we shall see, I think, why it was that Collingwood at an early stage of the advance "made the signal for the lee division to form the larboard line of bearing and to make more sail." That he did make it is unquestionable. The words just quoted are from his own journal. But the time at which he made it is not there given, and from the context it might be supposed that it was not made until after 10 a.m. In the schedule of signals given by Mr. Corbett, however, we find that signals 42 and 88 were made successively by the Royal Sovereign, with little or no interval between them, at about 8.45 a.m. The meaning of signal 42 was: "Form the larboard line of bearing, steering the course indicated;" and it was further explained in the signal book as follows: "The ships to bear from each other on the point of the compass on which they would sail, keeping a point from the wind, if formed in a line ahead on the larboard tack." Now, the wind was variable from N.W. to W. According as it was at one or

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other, or at any of the three points between the two, the points of the compass on which the division would sail in a close-hauled line on the port tack would respectively be N.N.E., N. by E., N., N. by W., and N.N.W. But the ships were to "keep a point from the wind," and as no ship could sail at one point from the wind, nor at less than six points from it, this must clearly mean, as Mr. Corbett interprets it, that the ships when formed in line would sail at "one point from the true close-hauled line—that is, seven points from the wind instead of six, which was the true close-hauled line." This being so, we have the directions N.E. by N., N.N.E., N. by E., N., and N. by W., as those in which the ships disposed in "the larboard line of bearing" would bear to each other according as the wind was at any point between N.W. and W. Now according to the log of the Victory, the wind remained at N.W. all the morning. But if Collingwood had it at this time a point nearer W.—that is, at N.W. by W.,* the ships in the lee division when formed in "the larboard line of the bearing" would be disposed in a line running from N.N.E. to S.S.W. This was precisely the line on which, according to the log of the Victory, the enemy's line was forming after it wore. Hence I have no doubt that Mr. Corbett is right in saying that the primary object of Collingwood's signal was to get his division into the position shown by the diagram annexed to the Memorandum. The formation in which he sought to dispose his division would, if fully carried out, bring that division into simultaneous action on a line of bearing parallel to that part of the enemy's line which he was directed to attack. Mr. Corbett further assumes that as soon as his own manœuvre was fairly advanced Collingwood would expect Nelson to commence the same manœuvre in his turn. In that assumption I cannot concur. Collingwood was anticipating by some hours the time at which Nelson had said in the Memorandum that "the signal would most probably be made"—it should here be noted that Nelson did not say that he would make the signal himself—"for the lee line to bear up together." As Nelson did not annul the signal made by Collingwood for the larboard line of bearing, nor in any way interfere with it, it must be assumed that, by taking no notice of it, not only did he thereby hand over to his second in command "the entire management of the lee line," as he said he would, but he tacitly signified his approval of what Colling-

* I have taken this particular direction of the wind merely as an illustration, and have not assumed that it was its actual direction. The point to be noted is that in whatever direction it was in between N.W. and W. the direction of Collingwood's line of bearing and that of Villeneuve's close-hauled line would be approximately parallel to each other. Collingwood was, in fact, "lasking down," in the phraseology of an earlier date.

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wood was doing. But it does not follow that he would do the same thing himself. He never said what he would do, but it may be taken for granted that he would so handle his own division as to carry out his main purpose of safeguarding Collingwood's movements from any interruptions or interference. If, as seems probable, his own division was by this time disposed in an irregular line ahead, there was an obvious advantage in keeping it in that formation, which is the most flexible formation a fleet can assume, and was one which, so long as it was maintained, would render it extremely hazardous, if not impossible, for the enemy's van to tack and come to the support of his centre or his rear.

The second signal, made by Collingwood at 8.45 a.m., was No. 88: "Make more sail. The leading ship first, if in line of battle or order of sailing." Mr. Corbett holds that in making the previous signal, No. 42, to form the larboard line of bearing, Collingwood was "actually overriding Nelson's signal for the order of sailing." I do not know if he is right in this contention, and I must leave the matter to the judgment of better seamen than I am. But it follows that if he is, he entirely destroys his own subsequent contention that "it is obvious that when a fleet is going large in line ahead, the close-hauled line of bearing"—why close-hauled?—"cannot be formed unless the leading ships shorten sail." Surely it can be equally well formed if the following ships make more sail, which was precisely what Collingwood directed them to do. It is true that if he was in line of battle, or if he was still in the order of sailing, the signal directed him to be the first to make more sail. But he was certainly not in line of battle, and Mr. Corbett says he was no longer in the order of sailing. Hence, if this view is correct, there was nothing to compel him to make more sail, while there was everything to compel the remaining ships of his division to do so. I must leave Mr. Corbett to resolve this paradox, for I cannot. It should be added that subsequently to this Collingwood repeatedly made signals to individual ships to make more sail, and once, at 11.40 a.m. (according to the time of the Mars) he made another general signal to the same effect. Nelson, too, at 11.55 a.m. (Temeraire's time), made the general signal: "Make all sail possible with safety to the masts." These several signals seem to show that the British ships cannot have been, as is commonly assumed, under all possible sail throughout the whole course of the advance. There is, moreover, evidence to show that at some period of the advance Collingwood did shorten sail. In the journal of Lieutenant Simmond, of the Royal Sovereign, there is an entry which is punctuated as follows in "Logs of the Great Sea Fights":—"Set studding sails. At 11 o'clock

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brought the ship under her courses." But in the original MS., which has been examined for me at the Record Office by my friend Mr. John Leyland, there is no full stop between "studding sails" and the words which follow. Hence it is not absolutely certain that the words "at 11 o'clock" specify the time at which the ship was brought under her courses. But it does seem certain that the Royal Sovereign did shorten sail at some time or other after Collingwood had made the signal to his division to form the larboard line of bearing.

I agree with Mr. Corbett in thinking that the larboard line of bearing was never completely formed. The reason is, as I view the matter, that Collingwood was soon to find that a less extreme line of bearing would sufficiently serve his purpose, which was to bring his division into action simultaneously on a line of bearing approximately parallel to the course of the enemy. If it had been necessary to form the line of bearing for this purpose I have no doubt that he would have done so, even if it had been necessary to shorten sail at once for the purpose. Nelson, it is true, did not shorten sail, and therefore Collingwood would hesitate to do so if he could effect his purpose without doing so. This, in my opinion, was rendered possible by the state of confusion and irregularity into which the allied line was thrown by the act of wearing. Collingwood must have noted this confusion, and also the fact that the rear of the allied line — consisting of Gravina's former *escadre d'observation* — was going free on a north-easterly course in order to reach the point at which the ships composing it could successively haul their wind and range up in the close-hauled line of battle; and he must have seen that until this evolution was completed—and if Mr. Corbett is right, it never could be completed if, after wearing, the whole of the allied line remained "motionless"—the required parallelism could be brought about by a much less extreme line of bearing than that prescribed by signal 42. Hence he did not himself shorten sail at once after making the signal—at any rate, there is no conclusive evidence that he did. I do not think that this was, as Mr. Corbett says, "because he saw that the line of bearing parallel to the enemy was impossible." It was, in my opinion, because he saw that a line of bearing much less extreme would in the circumstances bring him parallel to the enemy. Having come to this conclusion he made a series of signals to individual ships having for their purpose to place those ships in a position on such a line of bearing as he now desired them to occupy. That he did not make similar signals to all the ships in his division must, I think, be taken to show that some of them were, like the Prince, too far out of station to be able to reach their proper positions, while the rest were already approximately in

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their proper positions. That a line of bearing was formed before the attack was delivered is conclusively shown by two indisputable facts: first, as we have already seen, the Revenge, which was nearer the rear than the head of Collingwood's division, was in action ten minutes after Collingwood himself was in action; secondly, at 9.20 (Belleisle's time), Collingwood ordered Tonnant and Belleisle to "interchange places in the line or order of sailing." Tonnant was Collingwood's proper next astern, but could not keep up, and Belleisle was next astern of Tonnant. Now, had the division been in line ahead, this interchange would have been effected automatically, since it was a general rule that when a fleet was in line ahead a ship which could not keep her proper station was to be passed by her next astern, no signal being required for the purpose. The fact that a signal was made proves, therefore, that the division was not in line ahead, and must, therefore, have been in a line of bearing so far as it was in any regular formation at all. It would surely be an unwarrantable slur on Collingwood's seamanship to suppose that this line of bearing was not what Collingwood wanted it to be in order to effect his prescribed purpose of making a simultaneous attack, even though it was not the larboard line of bearing prescribed by signal 42.

I am quite unable to understand Mr. Corbett's further comment on this point. "It has," he says, "been taken for granted that he made it (signal 42) in consequence of the fact that a concavity which developed in the allied line had brought Gravina's division almost parallel with Collingwood's approach. But if this were so, the larboard line is not the signal he would have required." Precisely so; and that, in my judgment, is the very reason why he never fully carried out the evolution prescribed by that signal. He found that a less extreme line of bearing would effect his purpose. "The truth is," continues Mr. Corbett, "it had nothing to do with the concavity. Collingwood gave the order nearly two hours before Villeneuve made the signal which, as we shall see, produced the malformation." On a subsequent page we are told that "this fortuitous malformation . . . arose from a chance shift of the wind," and almost immediately afterwards that "the signal which produced it was not made by Villeneuve till after ten o'clock." I have not been able to discover that Mr. Corbett anywhere tells us specifically what this very remarkable signal was; nor does he anywhere explain how any shift of the wind or any particular signal—for both causes are assigned—could produce a "fortuitous malformation" in a fleet which, as we are assured, remained "motionless" after wearing. It cannot have been the signal to wear that Mr. Corbett is here referring to, because that was certainly made at, or soon after, 8 a.m., and it is

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a point, though a very obscure point, in Mr. Corbett's own argument that "within half an hour of Villeneuve's making the signal to invert the order of battle, Collingwood signalled to the lee division to form the larboard line of bearing." What, then, was this wonder-working signal which, aided by "a chance shift of the wind," produced a "fortuitous malformation" in the allied line? In the schedule of signals given by Colonel Desbrière ("Trafalgar," Appendix, p. 285), the only general signal made by Villeneuve at or about 10 a.m. runs as follows: "À 10 heures, ordre au vaisseau de tête de serrer le vent, et aux autres de le suivre par un mouvement successif." This signal was repeated an hour later. If this is the signal to which Mr. Corbett refers, it disposes once for all of his astonishing theory that the allied fleet remained "motionless" after wearing; but it does not in the least help him to determine what was the position and course of Gravina's division at the time that the signal was made—and that is the only point worth considering in an appreciation of Collingwood's movements and dispositions. For myself, I shall continue to believe, in spite of all that Mr. Corbett has written, that Collingwood knew what he was doing, and why he was doing it, when he made the signal for the larboard line of bearing, and afterwards, for equally good reasons, converted the evolution prescribed into one for a less extreme line of bearing; and, further, that he knew what he was saying when he wrote to Sir Thomas Pasley that the plan which Nelson had determined to adopt "was executed well, and succeeded admirably." And, finally, I would adopt, with a difference—inserting a negative not to be found in the original text—Mr. Corbett's own comment on this part of the proceedings: "It is, of course, possible, by selecting fragmentary passages from ill-kept logs and journals, and by calculations based on the various times at which ships alleged they engaged, to infer that possibly a real line of bearing was (*not*) formed; but the rigour of historical science absolutely forbids such fragile web-spinning to obscure a question which is illumined *by direct and unimpeachable evidence* to the contrary."*

* The italics are mine. Mr. Corbett further says, in the same passage: "Not only have we the categorical positive of the signals and of the very best authorities present, but there is the irrefutable negative that in all the mass of contemporary description there is absolute silence as to the lee-line having approached in the manner suggested." The categorical positive of the signals is, as I have shown, open to dispute; as to that of the very best authorities present, I must repeat that the very best authority present was Collingwood, that his testimony must outweigh that of a hundred Moorsoms, Senhouses, and their like, and that there is, to my mind, a categorical negative in his deliverance of it. As to the irrefutable negative of absolute silence, Mr. Corbett must reconcile it, if he can, with what he calls, on a subsequent page, "the deliberate summary of the Spanish staff, drawn up when all the circumstances were known, and after making all allowances for inaccuracy of detail. 'The attack,' they say, 'was upon the centre and rear of our line, and by concentrating their force upon it, *they involved the rearguard in a regular action, line to line*, doubling our extreme rear, and leaving the van out of action.'" Here again the italics are mine.

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So much for Collingwood's method of approach and attack. It remains to consider Nelson's. I have no doubt Mr. Corbett is right in saying that the weather division was formed in an irregular line ahead, and that, as the ships in forming the order of sailing came in from the port quarter, their disposition might for some time wear the appearance of an irregular bow and quarter line disposed to port. This, together with the irregular bow and quarter line disposed to starboard of the lee division, might easily lead observers in the allied fleet to suppose, as they did, that the two divisions were advancing on slightly convergent courses. But I cannot for a moment agree with Mr. Corbett that Nelson, in the Victory, was steering throughout for a fixed point in the enemy's line, or, as he says in one passage, "for the centre, just ahead of the Santisima Trinidad." This would be impossible, unless the allied line was stationary from the outset—in which case the operation of wearing could never have been effected—and it is altogether disallowed by the passage already quoted from the Victory's log, the plain and indisputable indications of which are plotted down to compass and scale in the diagram given above. Unless, therefore, we ignore altogether the written testimony of the master of the Victory, we must assume that the true character and direction of Nelson's advance was as shown in this diagram. "It will thus be seen," as I wrote in "Nelson and other Naval Studies," p. 59, "that Nelson did by eye and instinct exactly what an instrument devised by Prince Louis of Battenberg now enables the modern naval officer to do by mechanism. It is the neglect of this dynamical aspect of Nelson's dispositions, and the too exclusive study of the statical aspect, as exhibited in diagrams scarcely ever correctly drawn, that has, in my judgment, led so many commentators astray."

It seems to me to follow, from the foregoing analysis, that the whole of Nelson's advance must be regarded as in intention a menace alike to the van and to the centre of the allied line, and as in effect a feint on the van. If he hauled a point or two to the wind he might make it a direct menace to the van. If he bore up a point or two from the course he was steering, E. by N., he might make it a direct menace to the centre. He did neither, and the reason why he held on his course cannot, in my judgment, be more clearly or more cogently given than it was given by Mr. Corbett himself in his earlier reading of the situation, as expounded in "Fighting Instructions," p. 311 :—

> Nelson . . held on in line ahead, giving no indication of whether he intended to perform the manœuvre—Howe's manœuvre of breaking the enemy's line simultaneously in line abreast—on the van or the centre, or whether he meant to cut the line in line ahead. Until they knew which it was to be, it was impossible for the enemy to take any step to concentrate with either division, and thus Nelson held them both immobile while Collingwood flung himself on his declared objective.

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If this is a true reading of the situation, it is plain that Nelson's dispositions exactly satisfied his purpose as declared in the Memorandum. Whether he actually made a feint on the van or not, by temporarily altering course to port, is comparatively immaterial. The Orion's log says he did. "The Victory, after making a feint of attacking the van, hauled to starboard to reach the centre." But this may merely mean that the original course of E. by N. was in itself a menace rather to the van than to the centre, and that this menace was seen to be a feint as soon as the Victory hauled to starboard. Many years afterwards Codrington, the captain of the Orion, said: "I have no doubt of the Victory having hauled out to port for a short space"; but this is not contemporary evidence. On the other hand, why, in the face of the contemporary evidence of the Orion's log, Mr. Corbett should declare that this alleged feint on the van "must be dismissed as a by-product of Codrington's enthusiastic admiration of his chief," I am quite unable to understand. There is other and unimpeachable evidence to the effect that Nelson did hesitate until the last between an attack on the van and an attack on the centre. At 11.40 a.m., according to the log of the Euryalus, he telegraphed to Collingwood: "I intend to push or go through the end of the enemy's line to prevent them from getting into Cadiz." Again, Dumanoir, who commanded the van, wrote to Decrès, in his own defence: "Au commencement du combat la colonne du Nord se dirigea sur l'avant-garde, qui engagea avec elle pendant quarante minutes."

Why, then, did Nelson abandon this intention almost as soon as it was formed? I think the reason is correctly given by Mr. Corbett. At this very moment Villeneuve for the first time displayed his flag. Previously Nelson had not known where he was and Collingwood had telegraphed to him that "the enemy's chief appears to command in a frigate." But now, as Mr. Corbett dramatically puts it, "the Commander-in-Chief was confessed. He was for Nelson and Bronte and no one else." Instantly Nelson bore up to starboard and passed down the line to attack the allied Commander-in-Chief. He was just coming within gunshot when he bore up, for Villeneuve had ordered his ships to open fire at the same time that he hoisted his flag. The point at which Nelson turned was about a ship or, perhaps, two ahead of the Santisima Trinidad. The Victory's log says: "Opened fire on the enemy's van in passing down their line." As he came past the Bucentaure, Villeneuve's flagship, he again turned sharp to port, passing close under her stern, raking her as he passed, and forthwith fell aboard the Redoutable. The Temeraire was his next astern. Her log

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records: "At 25 minutes past noon the Victory opened her fire. Immediately put our helm to port to steer clear of the Victory and opened our fire on the Santisima Trinidad and two ships ahead of her, when the action became general." Whether the other ships astern followed round the curve made by the sharp turn of the Victory to starboard is not certain, but it seems unlikely that they would. Nelson's attack was now developed on the centre. Their last instruction, received verbally from Blackwood on his return from the Victory to the Euryalus, was that it was Nelson's intention "to cut through the enemy's line about the thirteenth or fourteenth ship, and then to make sail on the larboard tack for their van." The intention expressed in the latter part of this instruction was, as we have seen, abandoned, but its former part was not cancelled by any subsequent signal. Hence it would seem probable that the rear ships of Nelson's division, seeing their leader turn towards his prescribed objective, would themselves take the shortest course towards the same objective, and not allow any pedantic adherence to formality to interfere with their getting there as soon as they could. For this reason I concur with Colonel Desbrière when he says: "La ligne de file se transformait au moment de l'engagement en un ordre semi-déployé sur un front de quatre à cinq vaisseaux." There is little difference between my reading of the facts of the situation at this point and Mr. Corbett's, but there is an essential difference between our respective appreciations of their tactical significance. It is not very material whether the weather line attacked in line ahead or on a front of four or five ships more or less in line abreast. The essential point to note is that Nelson's intentions, as indicated in the Memorandum, were fulfilled, and his tactics were at an end when he turned to starboard, just within gunshot, and passed down the enemy's line "so as to ensure getting at their Commander-in-Chief, on whom every effort must be made to capture," as he had said in the Memorandum in his instructions for the leeward attack. Up to the point when he turned, his division was more or less in line ahead, but it was not in that formation for the purpose of attack, nor, as I think, did it attack in that formation; it was rather in that formation for the purpose of advance, and more particularly for the one paramount purpose indicated in the Memorandum of "taking care that the movements of the Second in Command were as little interrupted as is possible." As soon as that purpose was fulfilled, Nelson was free to do as he pleased, and it was certain that what he would do would be to go direct for the enemy's Commander-in-Chief. But the line ahead was no essential part of his tactics; except for the advance, it was not maintained after the Victory came under

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fire, nor was it employed in the final onslaught. In this sense I am diametrically at variance with Mr. Corbett. I am satisfied that the lee line did not attack in line ahead, and I am very nearly as sure that the weather line did not. There were, therefore, no essential departures from the plan of the Memorandum. There were only such departures as Nelson himself anticipated when he wrote to Collingwood: "I send you my Plan of Attack, as far as a man may dare venture to guess at the very uncertain position the enemy may be found in."

JAMES R. THURSFIELD.

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CHAPTER VII.

The Dreadnought Era.

A PERIOD OF NAVAL PROGRESS.

The present time is very critical for the British Navy, and, indeed, for all navies. Changes of the utmost importance, affecting both the *personnel* and the *matériel* of the Fleet, have been introduced, which would appear to mark the beginning of a new epoch in the history of the Navy. The lessons of the war in the Far East are not yet completely known, though in this country more than any other, save those which were actively engaged in the conflict, they are beginning to be fully realised. In many respects they were anticipated, and the Dreadnought, which was designed before they were known, has been changed in no essential particular. Other Powers are following in our wake, and endeavouring to gain the advantages which we are believed to have secured by building larger vessels of increased speed and more powerful armament. There are new views as to systems of propulsion, relative speed, armament, and the distribution of armour.

These remarks are taken from the preface to the *Naval Annual* for 1906, the year in which the Dreadnought was launched and completed, and their truth and pertinence must be generally acknowledged. The changes to which the Editor referred have been indeed varied and important. The object of this chapter is to investigate their working and results, in so far as they have affected the development in design and equipment of every class of ship; have altered the system of preparing the Fleet for ready action, and, above all, have made a radical difference in the method of training the crew to fight the ship. It is not proposed to institute a discussion upon the relative value of one or the other elements which go to make up the battle worthiness of a war vessel, or to argue that undue importance has been given to this or insufficient attention to that quality, but merely to pass under review the progressive advance which has accompanied those changes which the Editor of the *Naval Annual* in 1906 said would appear to mark the beginning of a new epoch in the history of the Navy.

Standards of strength.

That the British people and many foreigners will continue to describe every new battleship as a Dreadnought until some other phrase or catch-word attracts as much attention, or crystallizes an attitude of mind towards the Navy, is probable; but every professional seaman knows perfectly well that merely as a synonym for a capital ship, or a ship fit for the line of battle, nothing could be more

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misleading than this use of the name at the present time. Nevertheless, it is but natural that in dealing with the facts of a technical calling like the Navy the layman should seize upon a formula or a phrase whereby to set up for himself a standard of comparison, or to differentiate some object the use of which he recognises to be essential, while the relative value of its factors of efficiency are beyond his appraisement. Thus he can measure by a two-keels-to-one standard what he is pleased to call the Dreadnoughts of two navies, though he may only partially recognise the difference between one ship and another, and be quite unable to measure their comparative efficiency. More often than not, the publicists who have to treat of naval topics in the daily papers, recognising this fact, deal also largely with "Dreadnoughts" and "super-Dreadnoughts," and the like, drawing inferences from their numbers alone, thereby giving undue weight to the material side of the Fleet.

Catholicity of change.

It is the business of those who write for professional men, as well as to educate the public, to endeavour to utilise the leanings of the latter and to guide them into a surer channel. For this reason, it has seemed appropriate to associate the name Dreadnought rather with an era than with any particular type of ship—the era of change, and specifically that era of change which it is the purpose here to review. It seems the more necessary to make this point because the time has come to explain that only as an indication of the period in which she was constructed can the term Dreadnought apply to many of the ships so called; in any other sense the application is rapidly becoming inappropriate. There will be quite as much difference between the King George V. and the original Dreadnought, with only five years between them, as between the King Edward VII. and the Royal Sovereign, although nearly three times that period elapsed between the dates upon which these two latter vessels were laid down. Again, the term as originally applied to ships carrying only one calibre of big gun as their principal armament has now become a misnomer, since it is held to include vessels like the British Lord Nelson, the French Dantons, and the Japanese Satsumas, which are not so armed. Moreover, the era which may be said to have begun with the Dreadnought has been one of change, not merely in regard to battleships, and it seems, therefore, a fitting title for a chapter in which an attempt is made to classify and set out in some kind of order the various permutations which have affected navies both in their *matériel* and *personnel*, and which will, by modifying method, rule, and practice, affect them still more as time goes on.

In analysing the changes of the Dreadnought era, whether those which concern the design of ships or those which affect the internal

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economy of the Fleet, it is as well to remember that, as Lord Selborne stated when relinquishing the office of First Lord of the Admiralty, every change is the result of a gradual process of evolution—the foundations of which must have been laid by earlier administrators—and which, although the underlying principles may remain, will assuredly be again the subject of modification as a result of trial and experience.

One-calibre gun ships.

The first and most striking change connected with the Dreadnought era was indisputably the advent of the all-big-gun one-calibre battleship. Apart from the increase in size, speed and power, the noteworthy claim was made in regard to this new type that in a larger measure than heretofore it embodied the views of the naval officer. The proposition was, in effect, that the ship had been fitted to the tactics of the seamen, who would no longer have to fit their tactics to the ship given to them by the naval architect. This may be correct, but whether it is so or not it is clear that after coquetting with the ram and torpedo, the gun was once more accepted as the chief and most trustworthy weapon of the modern battle fleet. The torpedo in big ships then assumed the character and quality of a protective element, enlarging by its menace the distance at which actions would take place, and only as a last resource finding its use as an offensive arm. It followed, as a matter of course, that as weapons must have an influence on tactics, so tactics should have an influence on design. The new type of ship, though it might not represent the views of all naval men, was at least an attempt to give to naval men the kind of ship it was believed they wanted, and one in which was combined, in the relative proportion which they asked for, those elements they most desired. Thus it would appear that offensive gun-power and speed were given a larger value than had formerly been the case.

Primary battery.

It was a great advance from the four 12-in. and four 9·2-in. guns which constituted the primary battery of the King Edwards, or even the four 12-in. and ten 9·2-in. guns which were mounted in the Lord Nelsons, to the ten 12-in. guns of the Dreadnought. In the first case, the weight of a broadside from the two calibres of gun was 4160 lb., in the second it was 5300 lb., whereas in the Dreadnought it was 6800 lb. In its way the change in the anti-torpedo battery was even more remarkable. The King Edwards carry ten 6-in., fourteen 12-pr. and fourteen 3-pr. guns, the Lord Nelsons fifteen 12-pr. and twenty-three 3-pr. guns; but the Dreadnought only twenty-four 12-prs. The process of evolution is manifest in both cases. It is explained in a phrase used by Lord Charles Beresford, in a discussion at the Royal United Service Institution, on

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February 26, 1902, on a paper by Admiral Sir John Ommanney Hopkins, entitled "Is a Second-class or Smaller Battleship Desirable?" He said:—

> We have too many sorts of guns in our ships. I was talking the matter over to my Commander-in-Chief (Sir John Fisher) the other day, and he used the best expression I have ever heard on the point. He said: "What we want in our ships is the biggest smallest gun and the smallest biggest gun." I entirely agree with him. I would have those two laid down in the ship, and not have the great diversity of armament that we have at present. . . .*

It was in accordance with this view that the primary battery and the anti-torpedo battery each came to consist of one calibre of gun only, and the intermediate calibres of gun disappeared. Furthermore, it may be noticed that what was then called the secondary battery had already shown a distinct inclination to increase in weight, and to approximate to the primary battery. Thus in the Admiral class of the early eighties the secondary battery consisted of six 6-in. guns; in the Royal Sovereigns it rose to ten 6-in. quick-firers, and in the Majestics to 12 of these guns. In the King Edwards four 9·2-in. guns were substituted for two of the 6-in. guns, and in the Lord Nelsons ten 9·2-in. guns formed the secondary battery, and the 6-in. guns were abandoned altogether. From this arrangement in the Lord Nelson it was only one step further for the secondary battery to become absorbed altogether in the main armament by the guns of heavier calibre. In place of mixed batteries on the broadside of four 12-in. and five 9·2-in. guns, there were instead eight 12-in. guns. Professor J. H. Biles, in his James Watt Anniversary Lecture, delivered on January 20th of this year, stated that the causes which brought about this development were as follows:—

> (*a*) Increase of range due to (*b*) Increase of velocity. (*c*) Increase of explosive charge after penetration. (*d*) Effective range-finders and accuracy methods. (*e*) Increase in effective torpedo range.

At the same time it was necessary to increase the size of the ships in order to give the larger deck space necessary to carry the greater number of big guns, and to increase the beam to support the heavier top weights. Meanwhile, the draught of water of the ships remained practically unaltered.

Secondary battery.

In regard to the smaller guns, whether described as a secondary battery, or as an armament for defence against torpedo attack, two points will call for attention: first, the calibre of the guns, and secondly, the protection given to them. This latter point will be dealt with more in detail when the development of armoured protection, which has gone on side by side with that of guns, is

* Report of Discussion in R.U.S.I. Journal, May, 1902, p. 665.

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described. The anti-torpedo armament of the Dreadnought is composed of twenty-four 12-pr. guns, and in this respect there is no difference between her armament and that of the Lord Nelsons. It has been stated, however, that the 12-pr. was mounted in the Dreadnought because the 1907 model of the 4-in. gun, Mark VII., was not quite ready. This latter gun is found in the three Invincibles and the Bellerophons, and it continues to form the anti-torpedo-defence armament of their successors. This gun is of 50 calibres and fires a 31-lb. projectile, as compared with the 25-lb. projectile of the 4-in. Mark VI. It is claimed for this new mark of the 4-in. gun that it is in fact much superior to the older types of 6-in., especially for its purpose as an anti-torpedo-gun. Its accuracy and rapidity of fire are much greater, and it has increased muzzle velocity and handiness of laying. Where it may be thought to fail is in weight of projectile and weight of bursting charge. With the great increase in size of destroyers of late years, a matter to be dealt with later, it has become doubtful whether a 4-in. shell has sufficient stopping power; but considering the limited time at disposal for repelling an attack, there must be an advantage in the greater rapidity of fire. In this connection it may be mentioned that many naval officers think that a case shot in the heaviest guns will become the anti-torpedo weapon of the future. In the 13·5-in. gun something like 50 balls could be put in a case shot, and this aimed approximately in the direction of the attacking vessels should prove effective.

Heavier big guns.

While, however, no change has been made in the anti-torpedo armament since the Bellerophon was designed, there have been two advances in the guns of the main battery. In the St. Vincent class, the 45-calibre 12-in. was replaced by the 50-calibre 12-in., with increased penetrative power and accuracy of fire at long ranges, though the same projectile was thrown. But in the Orion a further advance was made to the 13·5-in. 45-calibre gun, which will form the main armament of all new battleships or armoured cruisers at present building or authorised. With this gun there is no difference in the rate of fire, while the power of penetration is increased by nearly 20 per cent.; but the important point is that as the shell carries a greater bursting charge, it will have an enormously increased destructive or smashing effect.

British disposition of guns.

The advance which has been made in size and power of guns has been accompanied by changes in their disposition, tending towards more effective concentration on the broadside. The Dreadnought fires but eight of her ten 12-in. guns on the broadside, and six ahead or astern. No change from this plan was made in the Bellerophon

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or St. Vincent classes, but in the Neptune two significant modifications occurred. The two wing turrets, instead of being placed abreast of each other, were écheloned—a system which had already been adopted in the armoured cruisers—and the middle centre-line turret was raised to permit its guns to fire over those of the after turret. This method had already been adopted in the American ships. By the changes thus made, all the guns could be trained on either beam, increasing the broadside fire from eight guns to ten, and the right astern fire from six guns to eight, and this without any reduction in the right ahead fire. These changes made the Neptune and her two sisters, the Colossus and Hercules, unique in the world's navies, but the disposition of their guns was only a temporary expedient, and may be regarded as an intermediate step between that of the original Dreadnought and that in which all the heavy guns were placed on the centre-line, the principle which was first applied in the Lion and Orion. This plan of centre-line turrets will be followed in all British armoured vessels building or authorised. The *échelon* system, which was chosen for the disposition of the armament in the Invincible class and in the Indefatigable, and which the Germans followed in the Von der Tann, had the disadvantage of necessitating wing turrets and reducing the arcs of training of the guns on the opposite side of the ship to the target. By increasing the length of the ship, as in the Indefatigable, a larger arc of training was obtained, but the advantage of keeping all the turrets on the centre-line was so obvious that it seemed bound in time to be adopted. Nevertheless, as will presently be shown, other nations have not yet followed our example.

United States Navy.

It is significant that the Americans, who of all nations have shown themselves most forward in trying experiments and testing new ideas, should have adopted the all-big-gun one-calibre battleship at the same time as ourselves. As was shown in an article on the "Gunnery Practice of the Fleet," in the *Naval Annual* for 1906, the Americans had recognised the needs and requirements of long range firing as early as we had; and there is a very close connection between what was called the new spirit in gunnery, with all that it tactically involved, and design. The Michigan and South Carolina, authorised in the year that the Dreadnought was completed, were given eight 12-in. guns of the type of which four only had been mounted in the ships of the earlier or Connecticut class. These guns were, however, placed in four turrets on the centre-line, a plan which has been adhered to in all the succeeding battleships of the United States Navy. Of this marked disposition to place all the heavy gun stations at the centre-line of the deck, so that all the guns might be

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available on both broadsides, Sir William White, in a Paper on the "Armament of Battleships," read at the meeting of the Society of Naval Architects in New York on November 17th last, said:—

> This was a return to a disposition adopted in the earliest British turret ships built nearly half-a-century ago. The United States Navy took the lead in this movement, and, further, had the credit of demonstrating the possibility of associating powerful bow and stern fire with the maximum of broadside fire over large arcs of training by placing some turrets higher than others and firing over the lower turrets on certain bearings.

Following the two Michigans came the Delaware and North Dakota, carrying ten 12-in. 45-calibre guns, or a similar number to the Dreadnought, but firing, by reason of the centre-line arrangement, two more guns on the broadside than the latter ship. The Utah and Florida, of the next year's programme (1908), were similarly armed, but the 1909 ships were provided with two more 12-in. guns, or 12 in all, and these were of an improved type. The 12-in. Mark VII. gun of 50 calibres in these vessels has a muzzle velocity of 2950 ft.-secs. and a muzzle energy of 52,483 ft.-tons, with an estimated penetration at 9000 yards of 11 inches of Krupp armour. The first of these vessels was launched on January 14th of this year and named the Arkansas, and at the time of her launch she carried the most powerful broadside of any battleship afloat, except the British Orion, launched a few months earlier, and the first ship to have the 13·5-in. gun.

Increase of offensive power.

The Arkansas and Orion afford an interesting comparison of two methods of increasing the offensive power—by augmenting the number of guns or making them more powerful individually. Their immediate predecessors, the Florida and Neptune respectively, each carried ten 12-in. guns, all firing on the broadside, and throwing severally a weight of metal of 8700 lb. and 8500 lb., the difference being accounted for by the American projectile being 20 lb. heavier than the British. By adding two more 12-in. guns the Americans increased their weight of metal on the broadside to 10,440 lb., whereas the Orion, with the same number of guns, but of 13·5-in. calibre, has a broadside fire of 12,500 lb., apart from other advantages. The value of the British plan has evidently been realised by the American naval authorities, who are mounting fewer but heavier guns in their 1910 ships, the Texas and New York. These ships will carry ten 14-in. 45-calibre guns, each firing a 1350 lb. projectile, which will give them a broadside fire of 13,500 lb. As the Michigan and South Carolina have a broadside fire of only 6960 lb., or 160 lb. more than the Dreadnought, the offensive power of the American battleships, measured in this way, has doubled in a little over four years. The new 14-in. Mark II.

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gun of 45 calibres, with a muzzle energy of nearly 66,000 ft.-tons, is expected to penetrate 12·5 inches of Krupp armour at 9000 yards.

American designers, like those of this country, have given to their later ships a more powerful anti-torpedo gun. Whereas the Michigan and South Carolina carried twenty-two 3-in. guns, as compared with twenty-four 3-in. in the Dreadnought, the Delaware and North Dakota were given fourteen 5-in. guns, the Utah and Florida sixteen 5-in. guns, and the Arkansas and Wyoming twenty-one 5-in. guns. The American 5-in. gun fires a 50 lb. projectile, as compared with the 31 lb. projectile of the British 4-in., so that they have an advantage in weight of metal and size of bursting charge, but against this must be weighed the number of rounds per minute capable of being fired from the 5-in. and 4-in. respectively.

German practice.

In Germany, as in Great Britain, an advance has been made in primary battery to a more powerful weapon. The first four ships of the Nassau class carry twelve 11-in. 45-calibre guns, each firing a 760 lb. projectile, but the principal gun of the Helgoland and her sister ships is the 12-in. 50-calibre gun, firing a 981 lb. projectile. This gun in turn is to be superseded by the new Krupp 14-in. gun, which is credited with a projectile weighing 1600 lb. It is uncertain which ship will be the first to mount this gun, but possibly the Ersatz Odin, as the initial unit of a fourth division, may carry it. So far as is known, this vessel, although she belonged to the 1910 programme, had not been laid down in March of this year.

The Germans, in regard to the disposition of the armament of their ships, have, so far as is known, followed the old French method, in which two heavy guns were mounted on the centre line of the deck as bow and stern chasers, and the others in positions on either broadside, which enabled those forward to be fired directly ahead and those aft directly astern. This arrangement has the disadvantage of restricting the broadside fire to two-thirds only of the guns carried. Both the Nassaus and the Helgolands are credited with this disposition of the principal armament, but so far the disposition of the guns in the ships on the stocks has not been divulged. In the first armoured cruiser, the Von der Tann, the system of placing the two centre turrets *en échelon* was followed, and it is understood that the same disposition will be made in the Moltke.

In all the German ships of the Dreadnought area so far placed in the water, the anti-torpedo defence consists of a powerful battery of twelve 5·9-in. or 6·7-in. guns mounted behind armour, and this in addition to sixteen or twenty 24-prs. Such a duplication of calibres appears to be unnecessary, but it is probably explained by an intention to use the heavier guns as auxiliaries to the 12-in. guns in

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action, as well as for defence against the attack of torpedo vessels. Probably a simpler arrangement such as that suggested by Sir William White in the paper already referred to would fulfil all requirements.

French methods.

The battleship development of the Dreadnought era in the French Navy is best shown by a comparison of the Jean Bart and Courbet with the six Dantons. Such a comparison exhibits an all-round advance in size, offensive power, speed, and armoured protection. The displacement has increased by 5000 tons and now amounts to slightly over 23,000 tons. The main armament is twelve 12-in. guns, as compared with the former mixed battery of four 12-in. and twelve 9·4-in. guns, and the speed shows an advance of a knot. A notable feature of the two new battleships is their anti-torpedo defence, which consists of 22 guns of 5·5-in. calibre. Assuming the French 5·5-in. gun to be more powerful than the American 5-in. (it fires a heavier projectile), there is no doubt that these new French battleships have the most powerful anti torpedo armament from one type of gun of all the ships of the Dreadnought era, built or building. The nearest approach to them in this respect would appear to be the Italian Dante Alighieri, which carries twenty 5·5-in. guns. The Japanese Kawachi and Settsu carry as many anti-torpedo guns as the French vessels, but they are of two calibres, 6-in. and 4·7-in., and it is doubtful whether this fact does not more than outweigh the slight superiority in weight of metal of the Japanese ships.

Japanese ships.

The Satsuma and Aki, of Japan, are not all-big-gun one-calibre ships any more than the French Dantons or the British Lord Nelsons, and their inclusion in lists of vessels of the Dreadnought era is only for convenience, and because they happened to be launched after the Dreadnought. The Kawachi and Settsu, in Japan, as the Jean Bart and Courbet, in France, must be regarded as the first full expression of the Dreadnought policy of their respective constructors. The Kawachi displaces 20,800 tons, and her guns are twelve 12-in., ten 6-in., and twelve 4·7-in. It has been suggested, in regard to the ordnance of the Japanese ships, that this may not express fully the desire of the Japanese designers, but has been to some extent limited by their resources for the production of new guns and armour. Corroborative evidence of this theory seems to be afforded by the placing of an order for an armoured cruiser in England, and by the recent shipment of guns from Elswick.

It is noteworthy, as was pointed out in the *Naval Annual* for 1910, in the chapter on Armour and Ordnance, that no general agreement has yet been reached as to the best method of disposition

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for the main battery of armoured vessels. The American Arkansas, the French Jean Bart, and the Japanese Kawachi are all contemporary ships, and each has a main battery of twelve 12-in. guns in six turrets; but owing to the different methods of distribution in each case, they can fire severally 12, ten, and eight guns on the broadside, and four, eight, and six guns ahead or astern. In the American ships all the turrets are on the centre-line. In the French vessels four are on the centre-line, two forward and two aft, with the remaining two turrets amidships and abreast of each other. The Japanese have mounted their guns on a similar plan to the Germans, with only two centre-line turrets, one forward and one aft, and the other four two on either beam.

Triple gun turrets.

To Italy belongs the distinction of having launched the first battleship to be fitted with the triple gun-turret—a notable development of the Dreadnought era. The Dante Alighieri, whose main armament will be twelve 12-in. guns, like the main armament of the latest ships actually building for the United States, Germany, France, and Japan, has four triple turrets on the centre line. This idea has also been adopted by Austria-Hungary and by Russia, but whether it will be followed by the authorities of any of the other Powers remains to be seen. Discussing the objections to this plan, Sir William White said that:—

> When three guns were mounted on one turntable and exposed to similar risks of simultaneous disablement, then, he thought, too many hostages were given to fortune, and economy in weight of protective material and mountings had been carried too far. Actual trial would determine whether or not it was possible to maintain the same rapidity in loading and firing individual guns in a triple turret as could be obtained when two guns were mounted in one turret; and the Italian naval authorities, before deciding in favour of triple turrets, probably satisfied themselves on this point. But even if the results proved satisfactory under peace conditions and as to rate of fire, only war experience could determine the crucial point as to the risk of simultaneous disablement of three guns mounted on a single turntable.

British armoured protection.

For several reasons, less has been said and written about the defensive qualities of the armoured ships of the Dreadnought era than about their other elements of war worthiness. The Navy Estimates do not contain particulars of the armour of the new ships, and therefore even about British vessels authentic information is scanty. This, coupled with the fact that up to the present time there have been few, if any, changes in the nature and quality of the protection, and that the gun has absorbed the greater part of the attention of naval students, has caused the matter of armour to be somewhat neglected. The Dreadnought has a complete belt 11 in. thick amidships, tapering to 6 in. forward and 4 in. aft. Above this main belt is another of 8 in. amidships, but this does not come high enough to protect a central casemate. The heavy guns are protected by 11-in. armour, and the deck plating is from $1\frac{3}{4}$ in. to $2\frac{3}{4}$ in. thick. The conning-

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towers, of which there are two, are also protected, one by 11-in. and one by 8-in. armour. The three Bellerophons have similar armoured protection to the Dreadnought, but this is not the case with the St. Vincents. In these ships there is a reduction in the thickness of the armour, possibly in order that weight might be saved for the increased armament and engine-power. It was also suggested that improved armour had been used. In the Neptune, however, a return to the thickness used in the Dreadnought was made, and in the Orion the main armour-belt is still thicker, though the protection to the heavy guns is the same as in the St. Vincent. In none of the earlier ships has any attempt been made to give armoured protection to the anti-torpedo battery.

United States ships.

In the Michigan the water-line belt is 8 ft. in width and more than 300 ft. in length. This belt varies in thickness from 11 in. at the top to 9 in. at the bottom. The side armour above this water-line belt is 8 in. thick at the top and 10 in. at the bottom. Athwartship bulkheads, moreover, are fitted at the after and forward ends of the belt. In each case this armour is 10 in. thick. The armour on the barbettes varies in thickness from 10 in. to 8 in., according to the protection given them by the side armour of the ship. In the North Dakota and Delaware there is a complete belt, extending from 5 ft. below to 3 ft. above the normal water-line. This armour is 11 in. thick at the upper edge and 9 in. at the lower. Above it is placed another strake of armour about 7 ft. wide, 10 in. thick at the lower edge and 8 in. at the upper. These thicknesses of armour cover the whole of that part of the ship occupied by the machinery, boilers, and magazines. Above these belts, the 5-in. guns are protected by 5-in. armour, thus carrying the armoured defence to a height of nearly 18 ft. above the normal water-line. There is, as in the Michigans, a strong protective deck, and the heavy gun positions are protected by armour from 10 in. to 12 in. in thickness. It seems probable from this description, and from inquiries made at the time of the recent visit of these ships to England, that a greater weight is assigned to protection in the North Dakota and Delaware than in any British battleships. In the Arkansas and Wyoming, the main armour belt, of about 8 ft. wide, has an average thickness of 10 in. Above this is another belt of the same thickness, and still higher is an 8-in. armoured casemate for the protection of the 5-in. guns and funnel bases. The barbettes are to have 11 in. of armour in the thickest part, and at the ends of the thicker belts and casemate are armoured bulkheads. A strong protective deck is worked in right fore and aft. Altogether, the Americans appear to have given a greater armoured protection to their ships than many other Powers.

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It is possible that some weight has been saved on propulsive power, and certainly some has been saved by the equipment of lattice towers in place of the very heavy tripod masts which are fitted in the British ships. On the other hand, it has been questioned whether the 5-in. armour on the casemates of the earlier ships would not be a disadvantage by exploding shells in the battery which might otherwise pass through the unarmoured sides. The thick armour in the American ships, like that on our own, is made on the Harvey-Krupp system, but in the later ships the thinner plates are of Carnegie special treatment steel.

German Navy.

A good deal of uncertainty prevails about the armoured protection of Germany's vessels. In the Nassau and her sisters the belt is believed to have a maximum thickness of 10 in., tapering to about 4 in. The protection of the heavy gun positions is believed to be 12 in. In the Nassaus, as in the American vessels, there is an armoured casemate, behind which the heavier guns of the anti-torpedo battery are placed.

The protection of the Von der Tann, as with British vessels of similar design, is less than that of the battleships, the belt, according to foreign authorities, being 6 in. at its thickest part, while the guns have 8-in. protection. It has been reported that the armour to be placed upon the later vessels is made upon an improved system, with increased resistance to penetration, but on this subject there is no authentic information to be obtained at present.

France and Japan.

Both in the latest ships of France and Japan there has been a considerable increase in armoured protection, and both these Powers have casemates of thinner armour for the protection of the bases of the funnels and the heavier guns of the anti-torpedo armament. Over a still larger portion of the ship is the protection carried in the vessels being built for the Argentine in the United States and in the Brazilian vessels built in this country. Generally it may be said that the indications point to a larger area of protection being given to armoured ships, and this will almost certainly be the case if by some new system of manufacture thinner plates should prove to be more effective than those which have been recently used for belts and citadels. It may also be said that internal protection in the shape of further sub-division of the hull has been a feature in all vessels of the Dreadnought era. It is of some importance to note that whereas the total weight of armour in the King Edward class was about 3500 tons, it has risen in our later vessels to about 4500 tons.

Advance in speed.

Turning now to the question of speed, a very important development in this respect has taken place, but a distinction must be made between the battleships and the battle-cruisers which have been built

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by this country and Germany. In the battleships built in Great Britain the speed was increased in the Dreadnought to 21 knots, from the 18 knots of the Lord Nelsons and the 18·5 knots of the King Edwards, and at the same time the horse-power was increased from 18,000 in the King Edwards to 23,000 in the Dreadnought. A further development was the substitution of turbine machinery for reciprocating engines. In the later battleships the horse-power has been increased to maintain the designed speed of 21 knots. The St. Vincent class develop 24,500, the Neptune class 25,000, and the Orion class 27,000 S.H.P. In the battle-cruisers, the Invincibles were designed for 25 knots, and the same speed was given to the Indefatigable, although the horse-power of the latter ship was increased to 43,000, or 2000 more than that of the Invincibles, owing to her greater size and weight. All these four ships exceeded this rate of speed on trial. In the Lion, the horse-power will be increased to 70,000, and it is reported that her designed speed will be not less than 30 knots. The advance in this direction upon earlier ships in the British Navy is so great as to be well nigh incredible, but it is necessary to bear in mind the similar advances in this direction which have been made abroad, and that it is essential for us to surpass if our pre-eminent position as the possessor of the most effective warships is to be retained.

Sir W. White's views.

The controversy on the subject of speed it will be unnecessary to deal with here, as both sides of the matter in dispute have been fully discussed in the *Naval Annual*. It may be well, however, to show that upon this question of speed it was very generally held in the Navy some years back that it was of the utmost importance to secure an advance in this quality of battle-worthiness. In the course of a lecture he delivered at the Mansion House on January 21, 1887, in connection with the Shipwrights' Company, Lord Charles Beresford being in the chair, Sir (then Mr.) W. H. White said:—

> Wide differences of opinion exist on many, if not most, of the features of warship design; but there is almost absolute agreement that high speed is of primary importance in all classes. It has been well said that in future naval actions speed will be the equivalent of "weather gauge" in the past. The swiftest vessels have the power of choosing their range and relative position, forcing or avoiding an action. Some authorities have been disposed to treat speed as of less importance in battleships than in cruisers, or the smaller classes, urging that fleet actions must always be fought at moderate speeds, and that it is the purpose of such ships to fight, not to run away. Viewed in the light of recent practice, however, this opinion does not find acceptance, and no one is prepared to deliberately sacrifice a quality which, under many circumstances, must prove of inestimable value even in ships possessing enormous offensive and defensive powers.*

American ships.

In America, the Michigan and South Carolina were designed for a speed half a knot in excess of that of their immediate predecessors—

* "Modern Warships." Wm. Clowes and Sons, 1887.

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18·5 knots with 16,500 I.H.P. The next pair of ships were designed for 21 knots, with 25,000 horse-power, and exceeded these figures on trial. Then, apparently owing to the increase in armoured protection, there was a reduction relatively in the weight given to propulsive machinery. The Utah and Florida were designed for 20·75 knots, with 28,000 horse-power, and a similar reduction has been made in the Arkansas, which, with engines of 33,000 horse-power, is designed to make 20·5 knots. The designed speed of the Texas and New York is not known definitely. These ships will, it is reported, be fitted with reciprocating engines instead of turbines, but many American naval officers regard this step as a retrograde one.

German ships.

The German battleships of the Dreadnought era are also slower than the British vessels, their designed speed being 20 knots. The best reported record on trial is that of the Nassau—20·7 knots. The engine-power of this vessel and her three sisters is 20,000, or 3000 less than that of the Dreadnought, and 4500 less than that of the St. Vincent. These German ships are not turbine driven. Whether better records will be achieved with the newer vessels, which are to be fitted with turbines, has yet to be seen. The only German battle-cruiser yet completed, the Von der Tann, is reported to have made excellent results on trial, and it has been a matter of dispute whether she was not for a time the fastest armoured vessel in the world. Her 45,000 horse-power is more than that of the Invincible's by 4000 and than that of the Indefatigable by 2000.

France, Japan, Italy.

In France, the 19 knots for which the Dantons were designed has been increased to 20 knots in the Jean Bart and Courbet, and these latter ships will be turbine-driven. The Kawachi and Settsu, the latest Japanese battleships, also show an increased speed, and while they will be half a knot less in speed than the British battleships, they will be half a knot more than the German, French and American vessels. It is, of course, likely that both in France and Japan the designed speed will be exceeded, as it has been in other countries. Italy must have the credit of having given to her first battleship of the new era a greater speed than that of any other battleship afloat. The Dante Alighieri is to have a speed of 23 knots, but whether she will accomplish this on her designed draught seems a little uncertain.

Trend of naval opinion.

It will be gathered from this summary of the armaments and their disposition, speed and horse-power, and protection of the two types of battleships which have been built or are building for the various sea-Powers, that, save in the matter of a general advance in size and power, there is not that uniformity which would justify

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placing them in one class and describing them by one name. Apart from the difference between the two types of battleships and battle-cruisers, the variation in the position of the heavy guns is considerable, and must have effect in tactical consideration. The secondary or anti-torpedo battery is not always of one calibre of gun, and in some cases is placed behind armour, suggesting the intention to use it in battle with the bigger guns. Nor are either the speed or protection of the ships identical, save that in every case nearly an increase in each element has been aimed at. The trend of naval opinion everywhere has been towards higher-powered guns, whether for the main or secondary batteries, higher speed, and a wider area of armour-protected surface. At present there is no indication, in spite of continuous improvements in guns and projectiles, of a return to weapons of less calibre. Indeed, such signs as there are point the other way. On the other hand, it is quite possible that before long the introduction of internal combustion engines and armour of greater resisting power, but less weight, may have a marked effect upon design.

Unarmoured cruisers.

The building of protected or unarmoured cruisers had practically ceased at the time that the Dreadnought was designed. Germany was the only Power with any protected cruisers in hand, these being of about 3400 tons displacement and carrying ten 4·1-in. guns as their armament. In this country, however, we were completing, and the United States was just beginning, a series of scouts, the British vessels being of slightly less than 3000 tons and the American of 3750 tons displacement. The former carried only 12-prs., but the latter were armed with two 5-in. and some 14-prs. These types have not been repeated, either in the British or American Navies, and for the first two years of the Dreadnought era no cruisers except the large armoured ships were put in hand in this country. Then in 1907, Lord Tweedmouth announced the construction of the Boadicea, of 3300 tons, with an armament of six 4-in. guns. The principal characteristic of this small cruiser was her speed, she being designed for 25 knots, and reaching nearly 28 knots on trial. She has been followed by five similar cruisers, in the last four of which the armament has been increased to ten 4-in. guns. In size and armament, the Boadicea class were inferior to contemporary German cruisers, and no surprise was felt when a new design of British protected cruiser was evolved in the Town class, of about 5000 tons displacement, with an armament of two 6-in. and ten 4-in. guns. The speed of this class was the same as that of the Boadicea. Only the first batch were given a mixed armament, the succeeding vessels being armed with eight 6-in. guns. The Boadiceas are utilised as

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parent ships to destroyers, and the Town class for service with the battle squadrons and on foreign stations. Both classes are turbine-driven, to which fact their high speed is no doubt partly due.

Foreign Powers.

Germany has continued building unarmoured cruisers, of which two are provided for annually under her Navy Law, and the Japanese launched in 1907 the Tone, an unarmoured cruiser of 4100 tons, carrying two 6-in. and ten 4·7-in. guns. Three other cruisers, larger, and having more engine power, but similarly armed, are in hand for Japan. With these two exceptions, the unarmoured cruiser construction of the Powers has taken the shape of small fast scouts, Brazil, Austria, and Italy having vessels of about 3000 tons under construction or recently completed, with speeds of about 26 knots. France and the United States have no cruisers in their programmes of new construction. Seeing that immediately before the period we are describing there were about ten different classes of unarmoured cruisers in the British Navy alone, it is evident that in regard to this class of vessel, as in other matters, there has been a movement towards simplification and against multiplication of types.

Torpedo craft.

The coming of the Dreadnought era influenced torpedo craft construction in a similar manner to battleship construction. Instead of destroyers of 550 tons and 25 knots designed speed, we have the Tribal class of nearly 900 tons and 33 knots designed speed, carrying, moreover, a heavier armament. Experimentally, too, there was built the Swift, of 2170 tons, of 36 knots speed, and an armament of four 4-in. guns. The general tendency has been to give the destroyers greater gun-power and better sea-keeping qualities. In subsequent programmes, the boats of the Beagle class were given one 4-in. gun and three 12-prs., and those of the Acorn class two 4-in. and two 12-prs. The designed speed of these boats was 27 knots.

Generally speaking, the leading naval Powers have followed the example of Great Britain. The United States destroyers now in hand are of 742 tons, with an armament of five 14-prs. Germany's latest launched boats are of 650 tons, with two 4·1-in. guns. French destroyers are of 750 tons, with an armament of two 3·9-in. and four 9-prs. The latest Japanese boats are no less than 1150 tons displacement, with an armament of two 4-in. and five 12-prs. The speed of these last-named boats as designed is 35 knots, but generally from 29 to 30 knots is the trial speed aimed at. With the large development of the powers of the torpedo, the armament of all these boats has also been increased in this respect.

Sub-marine advance.

Side by side with the destroyer during the same period, and more or less tending to take its place as the torpedo carrier of the future, the submarine has also advanced in size and power. In France and

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Great Britain, the development of the submarine has been little short of marvellous. The latest boats in hand for the British Navy will have a submerged displacement of nearly 800 tons, and a surface speed of 15 knots. Compared with this, the B class and the early C boats, which were being built at the time of the launch of the Dreadnought, had a displacement of 314 tons and a speed of 13 knots. These figures do not convey fully the development in the submarine, for the sea-keeping powers and radius of action of the latest boats quite equal those of the destroyers. Except France, which has always been to the fore in submarine construction, no other Power has at present any boats at all comparable with those of this country, nor anything like the same experience in their use. Authentic particulars are lacking of the latest German submarines, but of those already built it is known that they are of not more than 300 tons submerged displacement, which is about the size of the last completed vessels for Japan and the United States.

What effect the increased size of destroyers and the advent of the submarine will have upon tactics remains a matter of speculation, although the almost continuous exercises, which in our Navy are such a marked feature of the period under review, cannot fail to have supplied data for consideration in this respect.

Future battleships.

Two interesting forecasts of the ships of the future may be aptly quoted here as significant of the views of naval officers and naval architects in this connection. Admiral Bacon, at the Institute of Naval Architects in March of last year, pictured a situation in which the functions of the large cruiser would be assumed by the battleship, high speed would become more and more necessary, and armour protection would be less accentuated than at present. The link between the ocean-going destroyer and the battleship would become closer, and it might reasonably be expected that the armoured monsters of the future would always be accompanied by torpedo craft of high sea-going speed as defensive and offensive satellites. Very different from this is the fighting ship of the future, as conceived by Professor Abell, in a lecture to the Engineering Society of the University of Liverpool in February last. It is his belief that as the gun becomes much more powerful than the armour, heavy plating above water will gradually die out, and the type of battleship of the future will be an oil-driven ship, almost submerged, protected by a thick horizontal deck, and by under-water armour against torpedo explosion. This semi-submersible battleship would be armed with big guns on high projecting towers and with submerged torpedo tubes; she would be difficult to hit above water and difficult to sink by torpedoes.

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Auxiliary vessels.

Something must be said here about the extraordinary growth during the period under review of the auxiliary craft attached to fleets. Not only has it been found possible to utilise many of the obsolescent war vessels for purposes of this nature, but many new ships have been built or purchased and fitted out on purpose to perform duties which have become imperative, owing to developments which have taken place in other directions, and to methods of tactics which novel inventions applied to naval warfare during the Dreadnought era have made essential. The British Navy owns in the Cyclops the largest repairing-ship or floating dockyard in the world, and another vessel fulfilling similar functions and attached to the battle squadrons of the Fleet is the Assistance, which, however, was built a year or two before the Dreadnought era opened. There are six other depôt and repair vessels in the British Navy which are equipped to accompany the sea-going fleets and able to carry out repairs for which vessels would otherwise have to proceed to one of the dockyards. These are attached to the Destroyer flotillas, for whom they carry coal as well. The introduction of oil, however, necessitated the provision of oil-carriers, like the Petroleum; a new vessel of this class, the Burma, was recently launched. The development of the submarine mine has called two new classes of vessel into being—the mine-layer and the mine-sweeper. Of the former there are now seven in the British service, all being converted cruisers of the second-class protected type; and of the latter there are five, these being steam trawlers, purchased and converted to this duty. A reserve of the latter class has been formed among the North Sea fishing trawlers. Another type is seen in the Aquarius, which, although known as a distilling vessel, is used as a general repair ship for destroyers. There are five submarine depôt ships in the British Navy, in addition to the gunboats of the Hazard class, fitted to serve with these flotillas; and lastly, there are the hospital ships. The gain to the immediate readiness of the Fleet for service, and its enduring mobility resulting from the provision of such vessels, must be incalculable.

In Germany special attention to auxiliary vessels for submarine and mining work has been paid, and about 20 mine-sweeping craft are in service, the majority of which are old torpedo-boats which have been converted. It has been reported that in exercises carried out by these mine-sweepers, 80 per cent. of the mines have been discovered and fished up by the trawl fitted to each vessel. For submarines Germany has a salvage and dock boat, the Vulkan, and two mine-laying cruisers are also in service, while it has been reported that two repair ships are to be built at Pepenburg.

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American auxiliary vessels include several fleet colliers, "supply ships," and hospital vessels, those in the second category including ships with refrigerating and distilling machinery, while one or two protected cruisers, like the San Francisco, fulfil duties as mine-laying ships. The provision of her own fleet colliers by the United States is interesting in view of the experience gained by the Navy Department during the world cruise of the Fleet. France and Japan are following the example of Great Britain and Germany in the provision of mine-laying ships, though the new vessels building for this service are smaller than those in use in other navies.

Improvement in gunnery.

Of even greater importance, as an epoch-making feature in the period which has been described as the Dreadnought era, has been the greater attention given to and the consequent improvement in gunnery. It is not the number of ships, nor the number of guns they may carry that will win battles, but the number of effective hits the gunners make when the target is firing back. Having described the development of the ship, it would be interesting also to review the development which has taken place in those matters that relate to her employment in battle. In recent issues of the *Naval Annual*, the details of naval reorganisation in this respect, the new systems of preparing for prompt mobilisation, the methods of training the fleets at sea which have been introduced of late, and the many changes in conditions of life in the Navy, have been fully described, thus it is unnecessary to repeat them here. The general effect upon increased efficiency is manifest in many directions. But something must be said about the gunnery practice of the Fleet, to the remarkable development of which a chapter was devoted in the *Naval Annual* of 1906.

British marksmanship.

The tendency of the last two or three years, strongly marked in the Service, and now for some time acted upon by the Admiralty—which in the end must always reflect Service opinion—has been to lay less stress upon the realization of imposing results from the gunlayers' test and battle practice, and more and more upon developing gunnery along lines which approximate closely to actual battle conditions. The renaissance of gunnery, which has been such a prominent feature of the Dreadnought era, has proceeded in the natural process of evolution. The public, which had taken little interest in the Navy, except on its purely statistical or numerical side, was suddenly attracted to this aspect of its efficiency, and it is easy to see to what a great extent the Admiralty policy up to about two years ago directly reflected the feeling of the country. The people required some simple standard of efficiency, and eagerly accepted the published results of the gunlayers' tests and battle

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practice as a measure of battle worthiness. So they were, in a sense, but not nearly the full measure nor so full a measure as was possible. It was necessary for the Navy in this respect to walk before it could run, and as it became realized that the tests must be made more stringent, so the public interest in the figures languished. At the same time their importance no longer loomed so large in the opinion of naval officers.

Director of Target Practice.

What has contributed more than anything else to the substitution of a higher standard in gunnery has probably been the institution of the office of Inspector of Target Practice. This post has now been held by three officers, all of them distinguished gunnery experts—Vice-Admiral Sir Percy Scott, Rear-Admiral Frederick T. Hamilton, and Rear-Admiral Richard H. Peirse. The present holder of this office, Captain Montague Browning, is undoubtedly a worthy successor to them. The staff of the Inspector of Target Practice has grown from year to year, as it has been found that the scope of his office can be usefully expanded. Under the guidance of Sir Arthur Wilson the tendency, already manifest in the time of Lord Fisher, to divide gunnery administration into two branches—making the Director of Naval Ordnance the Board's advisor as to *matériel* and the Inspector of Target Practice the Board's advisor as to technique—has shown a distinct advance, and doubtless in the near future this specialisation of functions may become definitely established. In so far as it is effective already, its value to the Service is clear.

Every year for the last few years the conditions, not only of battle practice, but of many other fleet practices besides, have been more and more approximated to the problems likely to arise in war time. Exactly what methods have been used to deal with these problems, and indeed the character of the problems themselves, are, and have quite rightly been, kept confidential. In the nature of things the development in methods has been rapid, and with all the gunnery specialists of the different fleets exhibiting their methods before the same staff of experts in the course of each year, it has naturally happened that every innovation which has proved successful has had an immediate opportunity of being made known throughout the Fleet. The Inspector of Target Practice has acted as a co-ordinator of methods and a guide to the development both of fire control and of the mechanical requirements of gunnery.

Recent development.

Those who are versed in the history of the growth of British gunnery from the eighties to the present time have not been surprised to find that Sir Arthur Wilson has himself taken a leading share in recent developments. Very soon after he hauled down his flag as Commander-in-Chief of the Channel Fleet he was actively employed

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in superintending experiments in fire control, and in many respects recent advance owes much to the initiative of his master mind. It will be remembered that his intervention came at an exceedingly interesting crisis in naval marksmanship. The natural result of the first keenness over the gunlayers' test and battle practice results was to attach an undue importance to what were to a large extent merely preliminary exercises. That an exaggerated importance was attached to these results became generally felt in the Service, as it became realised that in long range practice the test of hits only is not the best criterion of the merit of the performance. Here the influence of the institution of the Inspector of Target Practice has again shown itself, because expert officers reporting on a whole performance can give a more trustworthy judgment on the merits of those responsible than the mere figures of hits could show.

Range of action.

It is, of course, well known that the first tendency of the institution of battle practice was to confine the firing to what may almost be called the extreme limit of range of the gun. While it is true to say that ten years ago hardly a round had been fired at a range beyond a mile and a half or two miles, within the next year or two almost all guns were being used at ranges of from three and a half to five miles. Recently a reaction appears to have set in against this, and now the middle ranges are being cultivated as assiduously as the longest. It has been recognised that thick weather and bad light must, in a large proportion of cases, make the longest ranges impossible of achievement; and to limit peace practice to these ranges, so it is argued, is to cultivate an entirely false standard.

Published firing results.

It has been said that there has been a reaction against the undue importance attached to gunlayers' test and battle practice results. This is not to say, however, that no importance ought to be attached to these results; and, as a fact, the results shown—marking, as they do, a consistently steady improvement both in the character of the methods used for training gunlayers and in the results obtained—are extremely satisfactory. The published returns of battle practice do not show the percentage of hits to rounds fired, but it is common knowledge that during the last three years this percentage has remained about constant, while the difficulties of the practice have been made greater year by year. It is, therefore, only reasonable to infer that the progress actually made in gunnery skill and marksmanship is considerable and important.

The value of the institution of the Inspector of Target Practice may be summarised as follows:—

(1) He and his staff have acted as critics and analysers of the shooting of the whole of the Fleet, both in battle practice and gunlayers' tests, during the last five

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years. Each year the accuracy and detail with which this analysis is made has increased, with the consequence that the most exact report can be made as to the value of each innovation or change of method or appliance.

(2) He and his staff consequently now embody the knowledge and experience gained since the institution of battle-firing. Each ship each year passes through a test under their supervision, and he and his staff thus come into personal contact with each captain and his gunnery organisation. Their reports, therefore, collect, compare, and co-ordinate the experience of the whole Fleet. These reports are circulated through the Fleet, and are, in turn, compared with the results obtained by the specialist staffs of the Naval Ordnance Branch and the Gunnery School.

The new era.

There is thus growing up in the matter of naval gunnery a somewhat similar kind of service within service for gunnery as already exists more or less in the matter of torpedoes, naval engineering, submarine work, etc.; and it is the creation of an organisation to make a special study of the methods of gunnery that has enabled developments of these methods in the present era to be so rapid and so satisfactory. This policy was originated by Lord Fisher when he appointed Sir Percy Scott as the First Inspector of Target Practice. The scope of the office has grown enormously in practice, and Lord Fisher and Sir Arthur Wilson—both of whose Service careers were marked by the keenest possible interest in naval gunnery—have encouraged this expansion with the most admirable results.

This review of the changes and developments of the last five or six years may be fittingly closed with the reminder that what is being done in the British Navy is being done in other navies also that aspire to reach a similar standard of efficiency. Never before has the desire to fit themselves for the real thing been more evident among naval officers and men than it is at the present time. This is the keynote of the Dreadnought era.

CHAS. N. ROBINSON.

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CHAPTER VIII.

The Declaration of London.

Points for Consideration.

The intended provisions of the Declaration of London touch so many vital points of national interest, and in their character and interpretation involve questions of such complexity and uncertainty, that it is not surprising a great controversy should have arisen concerning them. In the Navy itself opinion appears to be divided, and there are certainly flag officers who, as we know by their public utterances, are opposed to the ratification of the Declaration, while there are, just as certainly, others who think that the gain will be greater than the loss, or that little change is likely to be effected by the Declaration. As to the view of the Admiralty we are not left entirely to speculation. It does not appear credible that Admiral Sir Charles Ottley, Secretary of the Imperial Defence Committee, or Rear-Admiral E. J. W. Slade, Director of Naval Intelligence, who were associated as delegates with the Earl of Desart, our Plenipotentiary, and with Mr. Eyre Crowe, C.B., and Mr. C. J. B. Hurst, C.B., of the Foreign Office, can have acted without knowing the mind of the Admiralty Board. In reply to Lord Selborne, Lord Morley said in the House of Lords that it would not be expedient to make known Admiralty views on the effect of the provisions, because to do so would be equivalent to informing a possible adversary of the manner in which the Admiralty might intend to use the powers of blockade, or other means of attacking an enemy's commerce. "In general terms I may say that the opinion of the Admiralty is that, in existing circumstances, the effect of the establishment of an International Court of Appeal and of the Declaration of London on this country, as a belligerent in the conduct of naval operations, would be small and inconsiderable." The fact that the First Lord of the Admiralty is one of the members of the Government who support the Naval Prize Bill presented by the Foreign Secretary, is probably indicative of the attitude of the Admiralty Board. Lord Ellenborough expressed in the House the view that such approval as the Navy gave to the Declaration was based on the conviction that it would be flung into the sea directly hostilities commenced, and that it would count for nothing in a life and death struggle between

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two first-class Powers. Tangles of dubious wording would be cut by the sword. He was of opinion, nevertheless, that the uncertainty of interpretation of the Declaration added fresh complications, and he objected to anything that might seem to tie the hands of seamen.

Origin of the Declaration.

The Declaration has its origin in a state of affairs which was universally felt to be unsatisfactory, especially in the hardships it imposed upon neutrals. When the war broke out between Russia and Japan, the contraband lists published by both belligerents were so wide and vague that shipowners did not know what their ships might or might not lawfully carry as cargo, and they had no knowledge of the treatment they might expect to receive in the belligerent prize courts. At the Hague Conference, Sir Edward Fry, a distinguished authority, characterised the international law of the day as "hardly anything but a chaos of opinions, often contradictory, of the decisions of national courts based on national law." Grave loss and uncertainty were imposed on the neutral shipowner, and it has been said that the object of the Declaration is to substitute international law for international anarchy. Again, in regard to belligerents, it was clear that, if one belligerent exercised rights of capture or the destruction of prizes which had been obnoxious to the other, the latter would be compelled to choose between fighting at a disadvantage or applying practices which were inconsistent with its previous policy, and of running the risk of thereby alienating friendly neutrals.

It must be realised that the Declaration is very largely the outcome of increase in the strength and influence of neutral Powers, and that practices cannot be adopted in modern war which were possible in former times without incurring the gravest risk of converting neutrals into belligerents. Indeed, if we examine the causes of the situation which had arisen, we shall find them very largely in our own practices in the past, when the relative importance of the weaker Powers was much less than it is at the present time. We were then fighting for our existence, and we held on to those rights as long as we could. The Lord Chancellor made this quite clear in the House of Lords:—

> It may be asked, Why was any agreement needed at all? I think the answer is to be found in the history of the last 120 or 130 years, to which I shall refer with brevity. In the old times there were constant protests against the action of the British Navy. Your lordships will remember the two Armed Neutralities and also the war with the United States in 1812, and, further than that, that this country was obliged from time to time itself to make concessions or departures from the extreme rights which it had asserted, because they were intolerable to many other nations. By the end of the Napoleonic wars one thing was clear, and that was that each nation was its own judge so far as international law was concerned, and interpreted its own laws by its Prize Courts without appeal, causing an immense variety and conflict of different opinions in different countries.

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Danger of refusing ratification.

We are brought by these considerations to a broad conclusion with regard to ratification. If the Declaration should be adjudged to be detrimental to the adequate assertion of our naval power, as many have alleged, nothing could justify its ratification. But nothing short of such disastrous consequences could justify us in refusing assent to an instrument which we invited the Powers to arrive at. The consequence of doing so would be to arouse throughout the world suspicion of our intentions. When we entered into conclave with the Powers, it was inevitable that there should be something of compromise. It is impossible to believe that Lord Desart and the delegates of this country did not do their utmost to wring every possible concession towards our national point of view, and, if now, having arrived at a compromise, we refuse ratification, there will be implied an attitude of hostility towards other nations which cannot but be detrimental to the maintenance of good international relations. On this ground alone nothing but real necessity should drive us to refuse ratification. If we are to stand apart from the nations, we must not be surprised to find the pace of competitive armaments redoubled in the near future. It appears, however, possible to append to the exchange of ratifications a note reserving expressly our liberty of action in moving for the amendment of special points which we may consider harmful, as, for example, the matter of the conversion of merchantmen, and we might declare our purpose of objecting to any judgment of the International Prize Court confirming a capture made by a merchantman so converted.

The International Prize Court.

With these preliminaries, we will proceed to set forth some considerations on certain special points. One of the chief bones of contention is the institution of an International Prize Court. It has been said of this Court that, for want of an accepted standard of International Law, it might have to fall back upon the notions of such law as are entertained in San Domingo or Hayti! The International Court is not to be bound by three centuries of legal decisions, but is to administer a new system of jurisprudence of which we have never heard before. Lord Halsbury expressed the view in the House of Lords that we were abandoning all those principles which had hitherto guided us, and were making the Declaration of London the sole authority for the International Court. On the other hand, it may be contended that the Court will prove an impartial Court of Appeal, and that its mere existence will tend to make the belligerent Prize Courts more circumspect than would otherwise be the case. In every instance the Prize Court decisions in the Russo-Japanese War were unsatisfactory, and there was no legal appeal, while diplomatic protests were unheeded. In any case, it is clear that we cannot

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expect, as belligerents, to retain unlimited rights of interference with neutral shipping and goods, while we resist the rights of other belligerent nations to interfere with neutral ships bound to this country. There are, no doubt, difficult questions connected with the working of an International Prize Court. We may dismiss from our thoughts the notion that the judicial mind is only discoverable in this country, and that elsewhere the principles of equity will be disregarded. The very existence of the Hague Tribunal itself is proof enough that the immutable principles of justice are as scrupulously valued by an International Court as they can be by any national court. But there are points of possible disadvantage. In the much-discussed report of M. Renault, presented on behalf of the sub-committee which prepared the Convention, it is admitted, on juridical principles, that the International Court cannot reverse a decision of a Court of First Instance pronounced in virtue of its own laws. The explanatory report remarks in this relation that it is for the International Court to supply the deficiency of positive law by its own conviction of justice and equity. But, obviously, every Government, and most of all the British Government, was bound to withhold ratification until the great powers conferred had been limited by some common agreement on the subject of Prize Law, and it is precisely this matter that the Declaration of London is designed to regulate.

Three important matters came before the Conference upon which agreement was not reached, and Professor Westlake has pointed out that, though "the dispositions of the present Declaration form an indivisible whole" (Article 65), we can join in the establishment of the International Court, and at the same time guard our interests by proper reservations on matters concerning which the Conference failed to agree. With regard to M. Renault's report, Mr. McKinnon Wood has stated in the House of Commons, and the Lord Chancellor and Lord Desart in the House of Lords, that the report is an official commentary which would be regarded by any Court having the Convention before it. At any rate, it would be possible, and it is certainly desirable, that on the exchange of ratifications we should declare that we regard the report of M. Renault's sub-committee as a comment elucidatory of intentions, and should invite the other signatory Powers to make a similar declaration.

Conversion of merchantmen.

The three points concerning which no agreement was reached, and upon which, therefore, it is possible to make reserves on the exchange of ratifications, possess importance because incidents arising from them may possibly come up on appeal before the International Prize Court. It is true, however, that the conduct of war in these matters is not affected by the Declaration, and that the Prize Court

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would most probably feel bound to confirm the decision of the National Court of First Instance, so that appeals in such cases might be few in number. The most important of the excepted matters is that relating to the conversion of merchantmen. Probably no Government, and certainly not the British Government, desires to do away with the right to convert merchant vessels into warships at need. The only point at issue is the locality in which such conversions may lawfully take place. Would it be right, in case of hostilities between Great Britain and Germany, for German merchant vessels to proceed to the Cape Verde Islands, or for neutral merchant vessels to proceed to those islands, and there be taken over by Germany—for such vessels to coal and equip in the neutral port, and then proceed to sea, convert themselves into warships, and prey upon British commerce on the trade routes to South America and round the Cape of Good Hope? The British Government has always resisted this view, and has contended that the conversion should take place in the territorial waters of the belligerent State, and it is widely held in this country, notwithstanding the fact that the Declaration of London does not alter the situation at all, that Great Britain should make a declaration on the subject and should reserve her right to move for a new international rule on the subject of conversion, such as would prohibit action like that adopted by Russia, in the war with Japan, when she passed the Petersburg and Smolensk, of her Volunteer Fleet, from the Black Sea through the Straits under the mercantile flag and converted them into warships in the Mediterranean.

A discussion on this subject took place at the Hague Conference of 1907, on September 17th, when by 32 affirmative votes and no negatives an agreement was arrived at on certain points relative to methods and limitations of the system of conversion. These are contained in Articles 1 to 6 of the section of the report of the Conference dealing with this subject. The stipulations do undoubtedly improve the situation. Henceforth a converted merchantman must be under the direct authority, immediate control and responsibility of the State whose flag she carries, and must bear distinctive signs indicating that she is a warship of her nationality. The conversion must be announced as soon as possible. The converted vessel must conform to the laws and customs of war, her crew must be under military discipline, and her commander must be a commissioned officer of the State to which the ship belongs.

The test of enemy property.

The second matter concerning which no agreement was arrived at, and which is not therefore touched by the Declaration, has reference to the question of nationality or domicile as the determining factor in deciding what is and is not enemy property. The British

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delegates at the London Naval Conference reported to Sir Edward Grey that "the adherents of the rival systems were evenly divided in the committee." The British view has been in favour of domicile as the criterion of the character of property. But there are various opinions on the subject, and the International Prize Court will presumably have the right to establish law upon the subject.

"Rule of the War of 1756."

The third excepted point relates to the determination of nationality under what is known as the Rule of the War of 1756, and Professor Westlake has suggested, in relation thereto, that on the exchange of ratifications the British Government should reserve "its liberty of objecting to any judgment of the International Prize Court maintaining the claims to a neutral character made by a ship engaging in a trade which, before the war, was closed by a belligerent to every flag but his own."

From these negative aspects of the Declaration of London we may pass to the actual and positive contents of the Protocol, which it is stipulated must be accepted or rejected as "an indivisible whole." But it may be well, first of all, to enforce the point that the effect of the Declaration cannot be appreciated properly, unless it is recognised that Great Britain cannot claim, in entering into a compact with other Powers, that they shall accept all her views of policy and practice as necessarily embodying the fundamentally correct principles of international law. She cannot, because of any special geographical or other advantage which she may possess, deny certain practices of naval warfare to Powers which do not possess the same advantages. Neither can she expect them to forfeit any advantages which may accrue to them from any geographical or other disadvantage which may be special to herself. If any agreement is to be ratified at all, it must embody compromise, and all the Powers concerned must accept the geographical, economic, social, or other advantages, or disadvantages, which are generally incident to themselves and to other States. In the case of Great Britain and the British Empire, these conditions are chiefly its island home seated athwart the approaches from Europe to the ocean, its dependence on foreign supplies, its widespread possessions, its numerous naval bases and coaling stations, and its greatly predominant tonnage of merchant shipping.

Blockade.

The provisions of the Protocol with regard to blockade illustrate the character of the Declaration as a compromise. In part they are a codification of pre-existent practice, but they introduce a new rule in laying down that neutral vessels may not be captured for breach of blockade "except within the area of operations of the warships detailed to render the blockade effective." Lord Stowell maintained

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that a neutral ship was capturable at any point on her line of route towards the blockaded port, and it has hitherto been possible to observe neutral ports suspected of fitting out or harbouring blockade-runners, and to capture these vessels as soon as they left the territorial waters. Henceforth, apparently, it will be possible merely to observe, and then to pursue such vessels until they come actually within the area of blockade operations. In relation to this matter, it may be observed that interference with the shipping of powerful neutrals is likely in future wars to be a matter of very serious consideration with belligerents. It is, perhaps, therefore an advantage to them that the area within which capture will be actually lawful is likely to be defined. The precise degree of limitation will, no doubt, be variable, but it was admitted by Admiral Slade, on the part of Great Britain, and by Admiral Le Bois, on that of France, that the blockade area would extend to a distance from the blockaded coast proportionate to the number of ships which the belligerent would be able or willing to assign to the particular service. The advantage, therefore, seems to rest with the Power which has the fewest ports or the shortest coast-line to blockade and the greater number of ships available both for the blockade and the pursuit of blockade-runners (under Article 20), and the disadvantage with the Power which has the greatest number of ports and the longest coast-line to blockade and the smaller number of vessels with which to undertake the operations.

Contraband.

With regard to contraband it cannot but be recognised as a merit of the Declaration that it will henceforth admit as absolute non-contraband the raw materials of many of our manufactures and a large number of other objects (Article 28), though it may be a demerit of the rule that it will interfere with our right to capture such raw materials when they are intended for our enemy, and thus limit our power of strangling that enemy's industries. Here, as in other parts of the Protocol, we discover a balance of advantages and disadvantages, according as we regard them from the point of view of attack or defence and of the belligerent or the neutral. The list of goods which are declared absolute contraband, being in the nature of supplies, equipments, and the munitions of war, calls for no comments. But the fact that food-stuffs, forage, grain, clothing, and other things are made capable of being treated as conditional contraband has led to a very great controversy. The anxiety arises from uncertainty as to the safety of the food supplies of the people, whereas in former times we have regarded the law of contraband as enabling us to forbid or restrict the supply of military stores and food to our enemies. In 1793 we claimed and exercised the right of preventing

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food-stuffs from entering French ports, and in 1885 France claimed the right to declare food contraband. Our change of view is due to the growth of population in this country and our increased dependence upon foreign supplies. It would be more harmful to us to have food declared contraband than to any other nation.

Here, however, it must be observed that whether the Declaration be ratified or not, the larger part by far of our food supplies will come in British bottoms, and therefore will always be capturable, as enemy property. It may further be noted that failure to ratify the Declaration will leave it open for any Power to declare food unconditional contraband, and that the extent to which such a practice will be resorted to will depend entirely upon the amount of respect inspired by the strength of the neutral Powers. As a matter of fact, Russia declared food absolute contraband in 1904, and only desisted upon representations which she did not think it prudent to disregard. She also placed raw cotton on her contraband list, which would not be permissible under the conditions of the Declaration.

Food supplies.

It was unfortunately impossible to gain the adhesion of the Powers to the British desire to make food free of contraband, and the only concession was the placing of it in the provisional list, whereby there is a certain restriction in the right to regard it as contraband. An enormous amount of discussion has taken place as to the nature and effect of these restrictions. Destination is the test of conditional contraband, and the latter status is presumed (Art. 34) if the goods are consigned to enemy authorities, or to a contractor (*commerçant*) established in the enemy country who notoriously supplies articles of this kind to the enemy; and, again, if the goods are consigned to a fortified place belonging to the enemy, or other place serving as a base for his armed forces. The vagueness of the term "*commerçant*" has been pointed out, and also the doubt as to the definition of a "base." Might not any British port be considered a "base" for the supply of troops in this country? Lord Halsbury in the House of Lords painted a gloomy picture of the effect of the Declaration on our national food supplies. Although it is impossible to make reservations with regard to this matter, it is surely possible to declare the sense in which we understand the doubtful terms, and to invite other Powers to subscribe to our views.

Continuous voyage.

The doctrine of continuous voyage is intimately related to these matters. Under the Declaration the principle referred to is abandoned, and it is contended that a shipper might despatch supplies, such as grain, intended for this country to a near neutral port, unimpeded, whence they could be despatched to a British port with diminished risk. Into the conditions affecting this matter it is

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unnecessary to enter here, but it may be observed that the provision, like several others of the Declaration, will cut both ways—if it presents an advantage, it may also restrict an opportunity.

There are certain provisions in the Declaration which, although each possesses importance of its own, do not claim special attention in this chapter. These are: (1) Unneutral Service, the status of neutral vessels which, by acting in the service of a belligerent, forfeit their neutral privileges (Art. 45–47); (2) Transfer to a Neutral Flag (Art. 55, 56); (3) Enemy Character (Art. 57–60); (4) Convoy (Art. 61, 62); (5) Resistance to Search (Art. 63); and (6) Compensation (Art. 64).

Destruction of neutral prizes.

Much discussion has, however, arisen concerning that chapter of the Declaration which deals with the destruction of neutral prizes. It was impossible to secure the adhesion of the Naval Conference to the British view on this matter, and the British Plenipotentiary and Delegates, having secured a definition of the limiting conditions and safeguards of such destruction, decided to recommend the inclusion of the rules in the Protocol (Art. 48–54). At the Hague Conference of 1907 the representatives of the British Government submitted a proposal for a declaration to the following effect: "The destruction of a neutral prize by the captor is prohibited; the captor ought to release every neutral ship which he cannot bring before a prize court." The United States submitted a similar proposal, but the Russians objected on the ground of the position of inferiority in which those belligerents would be placed who had no maritime bases except on their own coasts. Sir Ernest Satow, however, supported the British proposal by maintaining that the destruction of neutral prizes was always in contradiction with the principles on the subject of neutrality, and that there did not exist any established international practice of destroying neutral prizes. There was revealed, however, such disparity of view at the Conference that the question was allowed to drop.

During the Franco-German War the German vessels Ludwig and Vorwärts were destroyed by their French captors, and the neutral cargo-owners were unable to obtain any redress from the National Court of Appeal—the prize-court at Bordeaux. In the Russo-Japanese War the Russians sank the Knight Commander, bound from Hoboken, in the United States, to Japan, because they believed her to carry contraband, and she was condemned by the National Court at Vladivostok. That the decision was reversed on appeal had nothing to do with the legality of capture. It is quite certain that many belligerents will not shrink from sinking neutral prizes in such circumstances, and this course of action will be unaffected by the ratification or other-

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wise of the Declaration of London. The truth is that we have been unable to induce other Powers to adopt the view of Great Britain, with her peculiar geographical situation, as a principle of international law. All that has been gained is the definition of the precise limitations and safeguards under which neutral prizes may be destroyed. It may, of course, be contended that, rather than see the destruction of such prizes recognised by international law, it would be preferable to refuse ratification altogether.

Conclusion.

The conclusion of all this is that the Protocol of the Naval Conference recognises and defines this and certain principles or practices which are part of the laws of naval warfare as conceived by others than ourselves. They have declined to bow to our judgment on particular points, and we have acknowledged and are preparing to confirm their view. Are we justified in refusing ratification and maintaining our views *contra mundum?* This chapter does not attempt to arrive at a final judgment on the difficult and doubtful matters at issue, but it appears to the writer to be certain that the objectionable features in the Declaration, or those excluded from it, but implicated in the operations of the International Prize Court, are not new, and that our refusal to ratify will not put an end to them. On the other hand, there are some new features in the Declaration, such as the list of contraband-free goods, which are likely to prove more advantageous to this country than to some others. But it cannot also be forgotten that the Declaration must be regarded from the several points of view of the belligerent attacking and defending, as also from that of the neutral, and that what is permitted or disallowed to other belligerents in war is permitted or disallowed to ourselves also. If it should be maintained that our geographical, economical and social situation is such as to make the ratification of the Declaration dangerous, we must be content with the anarchy which has hitherto masqueraded under the name of international law.

JOHN LEYLAND.

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CHAPTER IX.

How the Declaration of London Concerns the Navy.

The international arrangement embodied in the Declaration of London (1909) is intended to apply when a state of maritime war exists. The signatory Powers—that is, those who have given their adhesion to it—expect with reason that during hostilities, whether they are belligerents or neutrals, important interests of theirs will be affected, perhaps considerably. The Declaration deals with questions that may arise between belligerents on one side and neutrals on the other, and, generally, does not profess to regulate the action of belligerent against belligerent. In all discussions of the Declaration, this simple fact ought to be borne in mind.

When naval hostilities are in progress, the Navy of any one of the signatory Powers, whether engaged in the conflict or neutral, will almost of a certainty be concerned. To what extent it will be concerned should be considered. If we are neutral, it will be the duty of our Navy to see that our rights are not infringed. Of this requirement we have much and fairly recent experience. Passing over other wars within the last fifty years, the following, in which we were neutral, and in which our Navy was frequently concerned, may be mentioned—the American War of Secession, the Franco-Chinese contest, and the Japan-Chinese War.

To make clear the extent to which our Navy may be called upon to intervene in connection with the procedure arranged by the Declaration of London, we must examine the principal provisions of that document and see how they will affect us (1) when we ourselves are at war, and (2) when we are neutrals in the midst of a considerable maritime contest. Naval officers are not likely to attach undue importance to mere paper agreements, formulated in time of peace for regulating the conduct of belligerents engaged in a fight for national existence, as regards either their opponents or the neutrals with whom they may come in contact. Naval officers do, however, know that whilst it will be their business, when we are at war, to defeat the enemy as thoroughly as possible, it will also be wise on their part to effect this with as little risk as may be of turning a neutral into an additional enemy. The risk of this may

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persumably be kept small by observance of rules which any particular neutral has accepted, and by which he has professed himself willing to abide. It is evident that the observance will be facilitated if the rules are settled and known. To settle them and make them known is exactly what the Declaration of London is meant to do. As far as it is likely to have any effect at all, it may be expected to have an effect favourable, on the whole, to the navy which, either as belligerent or as neutral, will be most often concerned during the period of hostilities. The frequency indicated will almost of a certainty be proportionate to the size and ubiquity of that navy.

It is desirable that this should be understood, because, in the discussions of the Declaration of London, which have been so frequent of late, the document has been regarded almost exclusively from the legal point of view. To the naval officer it is of relatively little moment whether the Declaration confirms, alters, or annuls particular doctrines of International Law. What it will be useful for him to know, when his country is at war, is what treatment a neutral is likely to stand; and when, in the midst of a contest, his country is neutral, how far, in cases affecting its maritime interests, it is prepared to permit belligerents to go. We may form a fairly accurate notion of both of these conditions if we look at the different provisions of the Declaration from the belligerent and also the neutral point of view.

Taking the more important items in the order in which they are placed in the document, we have, first, blockades. To be binding as against neutral vessels, a blockade must be maintained by a force sufficient really to prevent access to the enemy's coast-line. As the capacity for employing on this work a sufficient force will obviously be proportionate to the strength of the navy desiring to establish a blockade, it follows that this proviso favours the strong navy, and consequently—if we are belligerents—ours. If we are neutrals, we shall be placed formally on the same footing as other neutrals, but with the advantage on our side that our possession of a strong navy will give us special facilities for supervision of the action of the blockading belligerent as regards our merchant vessels. How important this is will be well known to those officers who took part in the defence of our interests as neutrals during the long blockade of the Confederate ports by the Federals in the American War of Secession.

Neutral vessels may not be captured for breach of blockade except within the area of the blockading operations. Here, again, if we are engaged in war, we shall, as having a strong navy, be favoured rather than prejudiced by this, because, owing to our naval strength,

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we may make the area of blockading operations more extensive than it could be made by a Power with a less considerable navy. If we are neutrals, our merchant vessels—which, owing to their relatively and absolutely great number, will be frequently met with on the high seas—will be exempt from liability to interference at the hands of a less considerable navy during great part—perhaps during by far the greater part—of their voyages.

Hardly any section of the Declaration of London has caused more animated discussion than that relating to the classification of food-stuffs as conditional contraband of war. Prolonged consideration of the matter is not needed to bring about the conviction that neither this classification, nor any other that could have been devised, will affect our position if we are belligerents. Shipping statistics make it quite certain that, war or no war, the greater part of the food and other commodities brought to this country must be carried in vessels under our own flag. The part that neutral vessels will be able to bring to us will be proportionately smaller when we are at war than it is in time of peace, because some of the foreign vessels now engaged in the trade will probably have become hostile, and, in any case, large numbers of them will be wanted to take elsewhere the place necessarily vacated during hostilities by some or all of the vessels of the belligerents. The result will be that we shall have to depend even more largely than at present upon our own vessels. These we must defend, and we shall do so by the very fact of keeping an enemy's men-of-war away from the ocean routes to and from our shores. If we so keep them away, every vessel coming to us, whether under a neutral or our own flag, will be equally defended. It is to be remembered that we maintain a strong navy for the express purpose of keeping open the ocean routes which connect one part of the British Empire with another, and each part of it with foreign countries.

If we are neutrals, the conveyance of food-stuffs will be open to our merchant vessels without interruption, on condition that the stuffs are not destined to territory belonging to or occupied by a belligerent, or to his armed forces, or to a place serving as a base for the latter. Other neutrals will have exactly the same right and no more; and it may be taken as certain that the possession of a strong navy by us will help greatly to ensure that, in our case, the right is respected.

In discussions of the Declaration of London, great stress has been laid upon the proviso in Article 34 that goods classed as conditional contraband of war—and therefore including food-stuffs—will be liable to capture under a neutral flag if consigned to a contractor or

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trader who supplies articles of the kind to the captor's enemy, or if they are consigned to a place serving as a base for the latter's armed forces. This proviso, or, indeed, any other, would be quite immaterial as regards food or other commodity brought to the United Kingdom when we are at war, because, as already shown, the system of offensive defence that we must adopt releases us in the case from all reliance on any convention or paper agreement. Here, pre-eminently, we must depend upon our naval defences. If, on the other hand, we are neutrals, our participation in the trade of conveying food-stuffs to a belligerent will put us at no disadvantage as regards other neutrals similarly employed.

The Declaration proclaims liability to capture for any neutral vessel which shall render to a belligerent unneutral service—that is to say, shall surreptitiously help the latter to the prejudice of his opponent. This is more likely to affect us when we are neutrals than when we are belligerents. In the latter case, the help that we could with any probability receive from neutral merchant vessels would at the most be small, and we should have a much better chance of receiving help from vessels under our own flag, which we should have to defend in any case. Relying for naval help on a neutral would be likely to involve the necessity of defending his mercantile marine generally, and not merely that part of it employed, as above alluded to, in bringing food or other necessaries to our ports.

If we are neutrals, and any vessel under our flag renders surreptitious help to one of the belligerents, the owner or captain of the vessel will do it with his eyes open. Had there been no Declaration of London, we may feel sure that the result of being caught in the performance of the act in question would have involved capture and liability to condemnation of the vessel. There is nothing in the details of the proviso immediately under consideration tending to encourage the hope that, if it were not accepted, the fate of the vessel would be different.

As regards destruction of neutral prizes—that is to say, neutral merchant vessels which have been detained or captured by a belligerent man-of-war, and which, if sent in for adjudication, would probably be condemned as good prize by a prize court—it is held that the procedure is contrary to usual British practice. There are, however, Powers which claim the right of adopting it, and which, in fact, have adopted it, and that recently. The Declaration sanctions it under certain conditions. To begin with, the vessel to be destroyed must be liable to condemnation on the facts of the case. She must not be destroyed unless refraining from doing so would endanger the safety of the captor's own ship, or probably prevent the success of the

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operations in which that captor is engaged. If it turns out that the circumstances did not justify the destruction, and that the destroyed vessel would not have been declared good prize, the destroying belligerent will be liable for payment of compensation.

If we are belligerents, the proviso as to destruction of a neutral merchant vessel formally authorises procedure to which, if the Declaration of London had never been heard of, we should most certainly have resorted. The public may be asked to reflect upon the inevitable fate of a British naval officer who, in the midst of an arduous war, would sacrifice his own ship or risk the success of a particular operation rather than destroy a suspected merchant vessel belonging to a neutral State.

Of course, we may be the neutral and someone else may be the belligerent, and the latter may be expected to act in similar cases as we undoubtedly should act in them. The officer who orders the destruction, in our case as well as in the other, may have less hesitation in so doing because he will know that what he has done will—in accordance with the terms of the Declaration of London—be made the subject of eventual judicial investigation by a tribunal on which both parties will be represented. Common-sense alone will convince him that this arrangement will tend to restrict the chance of his act resulting in the conversion of the neutral concerned into a fresh enemy to his country. This restriction, however, will depend upon these conditions—*viz.*, that the act in question has been performed in good faith, and that it is not repeated so often as to raise suspicions of an intention to do the neutral mercantile marine concerned an injury. It is quite conceivable that a belligerent may be so disloyal to some particular neutral State that he may see in what are called the rules of International Law—as already supposed to exist or as formulated in the Declaration of London—authority for injuring the peaceful maritime interests of that neutral. If there is one Power in the world more capable than another of dealing effectually with such a state of things, it is the British Empire, simply because of its naval strength. Here, again, as far as it will have practical effect, the Declaration of London will rather favour the strong navy. Although, when belligerents, we may have destroyed one of his merchant vessels, no maritime neutral is likely to prefer war with us to settling the difference between ourselves and him by reference to an international tribunal.

It is difficult to understand the state of mind which has produced denunciatory criticism of the Declaration because it does not contain provisions concerning the conversion during hostilities of merchant vessels into men-of-war on the high seas. This completely loses

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sight of the fact that the Declaration has nothing to do with questions between belligerent and belligerent, one of which the conversion mentioned evidently is. Persons who are pleased to believe that a paper arrangement formulated in time of peace would really govern the action of a heated combatant as regards his enemy are beyond the reach of argument. There are many more persons to whom reason can successfully appeal. These have been misled by the noise made by the others into supposing that the assumed conversion cannot be dealt with by naval means, which, indeed, are the only means by which it can be dealt with. As far as we are concerned, we wanted no Declaration or other international arrangement to put us, if belligerents, in a good position in connection with the matter, because we are in a good position already. We can play the game as well as our antagonist—indeed, better than our antagonist. If it is to be a matter of converting merchant vessels into men-of-war, no examples are needed to prove what is self-evident—*viz.*, that we have a greater number of vessels suitable for the particular conversion, and greater facilities for effecting it. People in this country to whom this bogey bears the terrifying aspect of menacing reality would find alleviation of their panic if they would engage in a simple form of war-game, and trace the movements and unavoidable experiences of a liner of, say, the Compagnie Générale Transatlantique or of the Hamburg-American Line converted on the high seas into a man-of-war in or just before hostilities with us.

Events in the late Russo-Japanese War showed that, when we are neutrals, the conversion of a belligerent's merchantmen into men-of-war on the high seas may lead him to imagine that he can interfere, much as he pleases, with our maritime commerce. The Declaration leaves this condition of things unaltered, and, consequently, leaves equally unaltered our powers of dealing with it. The belligerent who insists upon resorting to conversion on the high seas will, if he unduly interferes with our commerce, find himself face to face with the strongest maritime neutral in the world. That includes a sanction far more effective than any paper declaration or other instrument could establish.

As regards the transport of articles classed as conditional contraband, the doctrine of "continuous voyage" has been given up. In the case of the United Kingdom and nearly every other part of the British Empire, when we are at war, the inexorable conditions of geography render this of no importance. We must keep open our sea communications; and—to mention no other reason—it is plainly less difficult to keep open those which come to us direct than those which go first to another country and then to the shores of some part

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of our sea-divided Empire. All the same, in certain easily conceived conditions of hostility, cargoes intended for the United Kingdom could reach adjacent neutral ports in neutral vessels unmolested —if the Declaration of London turns out to be effectual—by our enemy, and then be conveyed to us across a narrow intervening strip of water more cheaply and about as expeditiously as they could be if we had to rely, for the latter part of the way, on land transport. That we shall ever have to employ this method of supplying ourselves in war, either in the United Kingdom or in other British Dominions, is so improbable that it need not be further dwelt upon. Our Navy, properly used, will settle the matter for us in a way which we should find far preferable. The case, nevertheless, had to be mentioned, because of the disinclination of such important bodies as Chambers of Commerce to put any trust in the capacity of our Navy to do the very thing in war for which it is maintained.

Abandonment of the doctrine of "continuous voyage" for conditional contraband of war is believed in some quarters to put us at a disadvantage as regards our enemy if he is a Continental European Power. This belief can have arisen only where the whole of the conditions that would exist in the hostilities as assumed have not been taken into account. If Germany is to be our antagonist, as is so often supposed, conditional contraband might, under the terms of the Declaration of London, be conveyed, without fear of interruption, in neutral vessels to Dutch, Belgian, Swedish, Danish, or Russian ports, and then be sent on by land or internal waterways to the German consumer, or—in the case of the Swedish and Russian ports—by short and easy trips to German ports, such as Danzig, Stettin, or Lübeck, in the same neutral vessels which had brought the commodities across the ocean.

In the first place, this assumption leaves out of sight the check upon traffic due to the more costly nature of land transport where that alternative is adopted. To this it may, perhaps, be replied that, admitting the prohibitive cost of conveyance by land, and the inconveniences of conveyance by internal waterways, utilisation of adjacent neutral ports, such as those of some Baltic States, is still at the disposal of the German belligerent, and that there is little prospect of any extra-Baltic antagonist being able to interfere with it seriously. This may be so, but it by no means exhausts the question. In a war as assumed, two great mercantile marines—the British and the German—would cease to ply between trans-oceanic ports and German ports, or those in practical communication with the latter. The shipping remaining would be quite insufficient to carry the raw materials of industry, which the Declaration of London

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proclaims non-contraband, as well as the food-stuffs. To show what the demand on neutral shipping for the conveyance of food-stuffs alone to a belligerent Germany would be, it may be stated that in 1909, whereas the total importation of wheat—not to mention other grains—into Germany was 2,433,098 tons (*M*), the quantity brought across the ocean from Argentina, Australia, and the United States of America was 999,980 tons. If neither British nor German shipping were available for this traffic, we may take it as certain that the remaining shipping of the world could not supply its place, and also take its share in the conveyance to German ports of non-contraband raw material, and, in addition, do its own work.

The above forecast assumes that there is only one belligerent on each side, and entirely ignores such international groupings as go by the names of the Triple Alliance or the Triple Entente. If these should be ranged against each other in war, the merchant shipping available for the traffic just referred to would be largely reduced, and the conveyance of articles classed as conditional contraband of war to the ports of the Continental State in question would be still further restricted—restricted, indeed, nearly to the point of extinction. No useful purpose can be served by applying the operation of the Declaration of London to arbitrarily selected conditions based on assumptions which are highly improbable, if not altogether impossible. Of course, if everything that by any stretch of probability would tell on one side be taken into account, and all that may be reasonably expected to tell on the other be omitted, a case can be made out against any international arrangement which the wit of man could devise. That is not the way to approach the consideration of the grave problems with which we are only too likely to be confronted if we are involved in a great war, or if we are to be in the position of neutrals when the contest is between other important maritime States. It is before all things desirable—indeed, urgently necessary—that our countrymen throughout the Empire should understand that in war what we shall be forced to rely upon to protect our maritime trade, to keep enemies from our shores, and to ensure regularity and sufficiency of supplies of food and raw materials, is the Navy—the Navy first and last, and all the time—and not international agreements or declarations formulated with such perfection that lawyers will be unable to find a reason for wrangling about them. It should also be understood that if we are neutrals while others are fighting, adhesion to an international agreement reduces the risk of our being unfairly treated, but that it will not secure us absolutely against being treated so. For the latter efficient naval defences must be looked to.

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The setting up of an International Prize Court of Appeal is, as far as the Navy is concerned, an innovation rather in form than in substance. The tribunal is one for the settlement of disputes, not between two belligerents, but between a neutral and a belligerent. As far as can be seen, the appellant will almost always be an aggrieved neutral. When the latter has a grievance against one belligerent or the other, and neither side will give way, the matter can be settled only by war or by negotiation. The odds are enormously in favour of the latter plan being adopted, with great probability of its taking the form of arbitration. Whatever it may look like, when viewed from the merely legal or narrow professional standpoint, the International Prize Court of Appeal will be in reality a standing arbitration tribunal, which can get to work much more speedily than an arbitration authority specially constituted, probably after long negotiations, for the decision of particular cases. This must be of advantage to a navy called upon, perhaps over and over again in a rapid succession of instances, to defend the maritime interests of the country.

CYPRIAN A. G. BRIDGE.

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CHAPTER X.

MERCANTILE AUXILIARIES.

I.

ONCE more the question of Mercantile Auxiliaries has been brought to the front. Apprehensions—it may be groundless apprehensions—have been widely felt in many quarters as to possible injury to shipping through the failure of the British delegates at the Conference of London to obtain from the great military powers the surrender of the right to convert merchant steamers into cruisers on the high seas. It seems not unfitting once more to examine in the pages of the *Naval Annual* the resources we possess in the fast ships of the British Mercantile Marine for self-defence. For the statistics of the position let us turn to the latest issue of that admirable publication, "Lloyd's Register of Shipping." The table below gives the total number of steamships of 4000 tons and upwards owned in the United Kingdom, Germany, France, and the United States.

Tonnage.	United Kingdom.	Germany.	France.	United States.
4,000– 4,999	696	59	8	3
5,000– 6,999	362	42	7	1
7,000– 9,999	168	7	2	—
10,000–14,999	63	1	—	2
15,000 and above	10	3	—	—

The following particulars as to the Fleets of the largest owners of fast steamships are taken from *Whitaker's Almanack* for the current year :—

LARGEST STEAMSHIP OWNERS IN THE WORLD.
Owners of over 100,000 gross tons in order of tonnage.

Lines.	Head Office.	Total Tonnage.	Knots.										Total.
			Over 20 knots.	20	19	18	17	16	15	14	13	12	Under 12 knots.	
Hamburg-American	Hamburg	934,000	1	1	...	...	3	5	4	17	14	40	93	168
Norddeutscher Lloyd	Bremen	692,000	4	...	1	2	...	5	15	6	20	27	56	136
White Star	Liverpool	461,000	1	2	...	1	5	4	1	...	11	1	4	30
P. & O. Steam N. Co.	London	460,000	2	1	1	14	3	7	3	16	4	4	8	63
British India Steam N. Co.	London	444,000	...	...	...	...	2	4	4	8	4	24	63	109
Elder, Dempster & Co., Ltd.	Liverpool	329,000	...	...	...	...	1	...	3	16	13	13	72	108
Union-Castle	London	319,000	...	...	...	...	11	2	...	3	5	13	10	44
Compagnie Générale Trans.	Paris	319,000	3	1	1	...	8	4	6	6	2	10	49	90
Nippon Yusen Kaisha	Tokio	307,000	...	...	...	...	...	1	9	10	18	4	37	79
Messageries Maritimes	Paris	289,000	...	...	...	...	10	4	...	1	23	26	2	66
Austrian Lloyd	Trieste	234,000	...	...	...	...	2	3	3	8	18	14	18	66
Cunard	Liverpool	202,000	3	...	...	2	...	2	1	2	1	...	7	18
Hamburg South American	Hamburg	197,000	...	...	...	...	...	...	2	1	1	5	33	42
Canadian Pacific Railway	Montreal	193,000	...	2	2	...	...	5	3	...	7	12	32	63
Union S.S. Co. of New Zealand	Dunedin	170,000	...	1	1	...	1	2	5	10	6	9	31	66

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Let us turn from ships to subsidies. Countries in which it is the national policy to foster maritime enterprise, and where individual initiative is wanting, are liberal in subsidies. The following figures give the annual payments at the date of the report of the Committee on Subsidies. There has been no important change.

British mail subsidies	£756,580
Additional payment to Cunard Company	150,000
Admiralty subsidies	77,813
	£984,393
French subsidies (including bounties for shipbuilding and navigation)	£1,787,271
Russian subsidies	364,756
Austrian subsidies	318,983
Japanese subsidies (approximate)	750,000

Looking to the extensive requirements of an insular country, doing an enormous trade, and bound to maintain speedy and frequent communication with every part of a world-wide Empire, British subsidies are moderate in amount. Nor are the payments by the German Government on a lavish scale. Including postal services, they aggregate £390,000. In Germany shipping enterprise is encouraged by the personal interest shown by the Emperor, by the distribution of honours to shipowners and seamen, and by payments, when they are required, for the promotion of German trade.

Viewed from the commercial standpoint, experience proves that subsidies are not an advantage. The reasons were given by Lord Pirrie in his evidence before the Committee of 1902. Subsidies encourage inefficiency. The favoured owners become less mindful than they would otherwise have been of the desirability of effecting economies. There are temptations to build boats to earn the subsidy and not to make that commercial success which, in sound shipping business, must always be the first consideration. The only true policy is the gradual acquisition of vessels, properly designed and constructed for the respective trades in which they are to be engaged. Let us pay the honour, which is their just due, to that illustrious band of British shipowners by whose skill, genius, and enterprise the noble fleets under the British flag have been created, without Government assistance, and mostly from small beginnings. Our shipowners owe much to the skilful builders of their ships.

Where, however, the aim is not commercial expansion, but rather to maintain the honour of the flag, and to secure the means of giving

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protection in war from the depredations of privateers, it may not be good policy to withhold altogether the aid of the State. In Germany concentration of ownership in two powerful companies has made it possible to build a few liners of large tonnage, and unmatched in speed, even at the risk of running at a loss. The performance of these notable ships have made for the advantage of the entire fleet to which they belong. The most important companies under the British flag are far below the German in tonnage and number of ships. They were falling back to the slower but perhaps more remunerative ships, such as the Cedric of the White Star Line and the Saxonia and Ivernia of the Cunard Company. These ships were two days longer on the transatlantic passage than the ocean greyhound under the German flag. We had to recover our position, and the aid of the State was indispensable. In the circumstances, it was good policy to enter into a contract with the Cunard Company for the construction and running of ships of the highest speed. It has given us, at an annual cost of £150,000, two noble ships—the pride of the British merchant navy.

II.

For the defence of our trade we depend, first, on the Navy. As to the superior fighting efficiency of ships regularly built for the Navy, as against improvised cruisers, there can be no question. Cruisers, however, are costly. They should be supplemented by mercantile cruisers.

The policy of creating a Reserve of Cruisers in the Mercantile Marine is not new. The earlier contracts for the conveyance of mails required that postal vessels should be suitable for conversion into armed cruisers. In 1853, upon the recommendation of the Committee on Postal Contracts, those wise stipulations were withdrawn.

The naval advisers and administrators of the United States were among the first to appreciate the importance of auxiliary cruisers. In a report of 1869 the Secretary of the United States Navy wrote as follows:—"There is another element of defence in time of danger perhaps as effective as any other available to wise and liberal statesmanship, and such means would be at hand if we had lines of ocean-going steamers established, of high speed and able to keep the sea for any length of time. Any of the ships could be converted quickly into a ship of war. A comparatively small force of this kind, appropriately armed, and let loose on the ocean under the command of bold and intelligent officers, would be a dangerous foe to the commerce of any country. Our own ships were substantially driven

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from the seas by two or three roughly-equipped vessels, much inferior in power to those of which I have spoken."

In our own country Sir Nathaniel Barnaby was an early advocate of the policy of creating a reserve of cruisers. In a paper read at the Institute of Naval Architects, in 1878, he proposed that the fastest steamships in the Merchant Service should be placed on an Admiralty list. They should be specially adapted for service as cruisers, by internal subdivisions, more complete than would be required in ships built solely for purposes of commerce. Armaments and fittings were to be prepared and kept in store at naval stations, as well as at home ports. The crews would be completed from Colonial Royal Naval Reserves.

In the discussions on Sir Nathaniel Barnaby's paper, his suggestions were supported by the high naval authority of Sir Spencer Robinson, then Controller of the Navy, and by Admiral the Hon. Sir Frederick Grey. The latter spoke as follows: "The idea of trusting to our merchant ships at all has been deprecated. Now, having been at the Admiralty, and felt the difficulty of providing, even in peace time, the force necessary to fulfil the various duties devolving on our ships of war, I think it would be utterly impossible for the Navy alone to provide sufficient protection for our merchant ships. Merchant steamers, properly strengthened, would be most useful: they would not take the place of men-of-war in the fighting line, or even as combatants in a single action, but they would be of great value as auxiliaries."

Continuing this historical sketch, in 1878 a further paper was published in the *Nautical Magazine* by the late Lord Inverclyde, for many years Chairman of the Cunard Company. His weighty words are as true to-day as when they were written: "There never was a time in the history of this country when the subject of the efficiency of the Royal Navy occupied a position of greater importance than it does at present. Our risks lie in the fact that the fleets of other nations are fast becoming powerful and reliable, and whilst no navy can numerically approach that of this country, yet there are nations in Europe whose fleets combined would undoubtedly give us enough to cope with. How, then, can we stride ahead as the greatest maritime Power and hold our own against the fleets of the world? Not by being satisfied with increasing the strength of the Navy proper, which, owing to the prodigious cost of modern war vessels, can only be done in a comparatively small degree, but by other means ready to our hand, and that by utilising the vessels of the Mercantile Marine."

The creation of a reserve of cruisers continued to receive attention. In 1880 Sir Donald Currie read a paper at the United Service

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Institution, in which he strongly urged that swift merchant steamers should be fitted as auxiliary cruisers and retained by an annual subsidy. The policy was supported by Sir Cooper Key and Sir Anthony Hoskins. These distinguished officers considered it desirable that armed merchant steamers should be built to protect themselves against the class of vessels which in war would probably be sent against them.

The collective authority of the Institution of Civil Engineers may be quoted. In his presidential address in November, 1903, Sir William White strongly advocated the policy of subsidies to mail steamers. He urged that all important maritime countries reckoned on the employment of mercantile steamers of high speed as a part of their naval force. In the Spanish-American war such steamers had rendered excellent service. Their great mass made it possible for them to keep up their speed in any kind of seaway, and their large bunkers enabled them to stay long at sea. They could always be relied upon not to break down; and the fact that they looked like merchant ships masked somewhat their identity.

The subject under review has been considered by the Members of the Institute of Naval Architects. At the summer meeting held in Glasgow in 1904 the present writer read a paper on Mercantile Auxiliaries. After discussion, it was resolved, on the motion of Sir John Hay, that "a Committee of Admiralty officials, shipbuilders and shipowners should be formed to discuss the best methods of constructing a combined naval and mercantile marine." The Committee consisted of Lord Glasgow, Admiral Sir John Dalrymple Hay, Sir Nathaniel Barnaby, Mr. B. Martell, the late Sir Francis Elgar, Professor J. H. Biles, and Lord Pirrie. Their recommendations were as follows:—

1. "That unless there is some undertaking between the State and the owners of fast liners and other desirable vessels to bind their ships to State service, these ships and vessels may be found unexpectedly in the hands of an enemy at the outbreak of war."

2. "That the contract should be of such a nature as would effectually deter owners from breaking it."

3. "That with reasonable inducement shipowners would set themselves to make their ships and vessels suitable for war purposes."

III.

Thus far the policy of the Admiralty in regard to auxiliary cruisers has been vacillating and barren of result. A brief sketch of the action taken by the Admiralty was given to the Committee on

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Steamship Subsidies by Captain Sturdee, of the Intelligence Branch. The policy of paying a subsidy in order to have certain rights over the fast steamships of the principal lines was considered so far back as 1878. After full discussion the idea was rejected on the ground that, when the time arose, suitable vessels would always be available to meet Admiralty requirements. That expectation proved strangely illusory, when, in 1885, the Board of Admiralty stood face to face with a possible outbreak of war, within a few days, with a first-class European power. A vote of ten millions for warlike preparations had been suddenly called for by Mr. Gladstone, and granted by the House of Commons without debate. We were ill-prepared. It had not been the policy of Parliament, or of any administration, to keep the Navy fully prepared for war. It was imperative to reinforce the Navy in cruisers, and the Admiralty took up 16 steamers. Great temptations were offered to the owners of the White Star Steamers running between San Francisco and Japan. Our whole commerce in the Pacific would have been transferred to the flag of the United States if that offer had been accepted. A Government in difficulties cannot negotiate on the most favourable terms. In the circumstances of the hour it was necessary to pay high rates, and that for vessels which, however capable in the hands of a hostile Power of inflicting serious damage on our merchant shipping, were too vulnerable to be regarded as in any sense efficient warships.

The experiences of the Russian scare were not lost upon a later Board of Admiralty. In 1887, when contracts for the conveyance of the mails to New York were being renewed, they addressed the following letter to the Treasury:—

"My Lords would desire to state that the experience derived from the events of 1885 has led them to believe that true economy and real efficiency would be best promoted by securing the use to the Admiralty in time of peace of the fastest and most serviceable mercantile vessels. It will be remembered that in 1885 a sum approximating to £600,000 was expended in retaining the services of several fast merchant steamers, so as to prevent their being available for the service of any Power inimical to the interests of the United Kingdom. Had arrangements existed similar to those now contemplated, their Lordships believe that a very considerable portion of this expenditure would have been averted, and a degree of confidence felt by the nation on which it is very difficult to place a money value."

The engagements made were onerous to the State. The total payments from May, 1888, to October, 1901, the date of Lord Spencer's return, exceeded £700,000. The necessary conditions were not

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insisted upon. Of the 30 vessels subsidised, 11 were 16-knot vessels, nine 17 knots. Ten only had a speed of 19 knots and over, and none were protected, nor was security taken against the transfer of vessels to foreign flags. The Admiralty has, in later years, viewed with little favour the policy of giving subsidies, yielding little in effective reinforcement to the strength of the Navy.

IV.

And now as to the first steps. If it should be resolved to supplement our large force of naval cruisers with auxiliary vessels, it will be well to proceed slowly. We may begin by providing armaments for fast steamers and securing to the Government a veto on transfers to foreign owners. To create a fleet of reserve cruisers must necessarily be the work of time. The Committee on Subsidies were of opinion that no subsidies should be paid unless to vessels of the highest speed and great coal endurance, built according to Admiralty requirements. When mail contracts are being renewed, or new contracts arranged, the opportunity should be seized, and action concerted between the Post Office and the Admiralty.

The possibility of building merchant steamers with as much protection for their upper works and for the gun positions as we find in regularly built cruisers has been affirmed by a succession of professional authorities of the highest eminence. In a paper read at an engineering conference held under the auspices of the Institution of Civil Engineers in June, 1899, Professor Biles, arguing from the results of arming and fighting the mercantile cruisers of the United States Navy for the war on the coasts of Cuba, took the view that such vessels are not unable to cope with thoroughbred warships. The issue of a fight between a warship and a merchant ship might not turn on the relative efficiency of the internal subdivision, but on the protection of the guns. By placing the guns, as the Americans did, in a box battery, a considerable number of guns could be as well protected in merchant ships as in first-class cruisers. As to structural strength, Mr. Peskett, of the Cunard Company, in an address delivered in Liverpool, gave the opinion that merchant steamers could actually be built lighter than they are under the present system if they were provided with one very strong protective deck with sloping sides.

There are other conditions. The British Admiralty has held that no postal or other contract should be given unless all captains and officers and a certain proportion of the men are British subjects. In the agreement between the North German Lloyd Company and the Government it is laid down that all adult deck hands and members

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of the engine-room staff engaged in Germany are to consist of men belonging to the Naval Reserve, or of persons bound to serve in the Imperial Navy if required.

We have to deal with coast defence. For this purpose auxiliary vessels could be obtained at a comparatively moderate cost We have 38 vessels in the cross-Channel service, in tonnage ranging from 1000 to 2500 tons, with a sea speed of 20 knots and above. Many of these vessels carry mails, and are subsidised. In future contracts it should be required that they should be enrolled in the reserve of cruisers. Fitted to carry a torpedo armament, they would be valuable auxiliaries to the flotilla for coast defence.

V.

The cost of a fleet of mercantile cruisers must depend on the number of ships in the reserve, on the structural conditions insisted upon, on the conditions as to manning, and very largely on the speed required. The Committee appointed by the Admiralty in 1903, with Lord Camperdown as Chairman, gave the figures set out in the table below :—

Ocean Speed.	First Cost.	Annual Subsidy.
	£	£
20	350,000	9,000
21	400,000	19,500
22	470,000	40,500
23	575,000	67,500
24	850,000	110,500

Ships capable of maintaining 22 knots over a long distance would not be ineffective for scouting duties. Protective arrangements—at least, by coal and armour—should be insisted upon.

In conclusion, it may once again be insisted that a reserve of fast cruisers is necessary; and that, in looking for the protection of trade to ships built for peaceful service, and not to cruisers built for purposes of war only, we pursue a policy in harmony with the growing desire for the settlement of differences by the method of arbitration.

BRASSEY.

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PART II.

LIST OF BRITISH AND FOREIGN SHIPS.
ORDNANCE TABLES.

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PART II.

LIST OF BRITISH AND FOREIGN SHIPS.

THE following abbreviations are used throughout the Alphabetical List:—

a.c.	Armoured cruiser.	H.S.	Harveyised or similar hard-faced steel.
a.g.b.	Armoured gunboat.	K.S.	Krupp steel.
b.	Battleship.	shd.	Sheathed.
c.b.	Cruiser-battleship.	P.	Protected.
c.d.s.	Coast-defence ship.	*t.*	Turret-ship (in class column).
comp. (in armour column).	Compound or steel-faced armour.	*t.*	Speed and I.H.P. at trials (in speed and I.H.P. columns).
cr.	Cruiser.	to.cr.	Torpedo-cruiser.
d.v.	Despatch vessel.	to.g.b.	Torpedo-gunboat.
g.b.	Gunboat.		
g.v.	Gun-vessel.		

l. Light guns under 15 cwt., including boats' guns.
M. Machine guns.
sub. Submerged torpedo tube.
A. Armstrong guns. K. Krupp guns.

The following abbreviations are used to distinguish the various types of boilers:—

W.T.	Water-tube boilers, where the type is not known.	My.	Myabara.
B.	Belleville.	Nic.	Niclausse.
Bl.	Blechynden.	Nor.	Normand.
B. & W.	Babcock and Wilcox.	N.S.	Normand-Sigaudy.
D'A.	D'Allest.	R.	Reed.
D.	Dürr.	T.	Thornycroft.
E.	Earle.	T.S.	Thornycroft-Schulz.
Ex.	Express.	W.F.	White-Forster.
Du T.	Du Temple.	Y^1.	Yarrow small tube.
L.	Laird.	Y^2.	Yarrow large tube.
L.N.	Laird-Normand.	V.E.	Vickers Express.
M.	Mumford.	cyl.	Cylindrical.

The following abbreviations distinguish types of turbines:—

P.T. Parsons. C.T. Curtis.

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GREAT BRITAIN.—Armoured Ships.

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Makers of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Aboukir** shd.	12,000	440	69½	26¼	21,375 B.	Govan	Fairfield	1900	1902	751,118	6–2 K.S.	3–1½	..	5 H.N.	6 K.S.	5	2 *9·2-in.*, 12 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 8 M., 2 l.	2	21·6 *t*	800 1600	755
a.c.	**Achilles** . .	13,550	480	73½	27	23,275 Y² & cyl.	Elswick	Hawthorn	1905	1907	1,191,103*	6–4–3 K.S.	¾–1	6	6	6	6	6 *9·2-in.*, 4 *7·5-in.*, 1 *12-pr.*, 29 *3-pr.*, 2 M.	3	23·27 *t*	1000	704
b.	**Africa** . .	16,350	425	78	26¾	18,698 B. & W. & cyl.	Chatham	J. Brown	1905	1906	1,461,429*	9 H.S.	2–1	8–7	12 H.S.	12–6 H.S.	7 K.S.	4 *12-in.*, 4 *9·2-in.*, 10 6-in., 14 *12-pr.*, 17 *3-pr.*, & M.	4	18·95 *t*	950 2150	781
b.	**Agamemnon** .	16,500	410	79½	27	17,285 Y²	Dalmuir	Hawthorn Leslie	1906	1908	1,651,289*	12–6 K.C.	2	8	8	12	7	4 *12-in.*, 10 *9·2-in.*, 24 *12-pr.*, & 5 M.	5	18·75 *t*	900 2500	865
b.	**Ajax** ‡ .	23,000	555	89	27½	31,000	Greenock	Scott P.T.	Bldg.	..	..	..	..	..	..	..	..	10 *13·5-in.*, 24 *4*-in. . .	3	21	..	..
b.	**Audacious** ‡						Birkenh'd	Cammell Laird P.T.	Bldg.	..	..	12 ..	..	9 ..	.. ..	10 ..	.. ..					
b.	**Albemarle** .	14,000	405	75½	26½	18,296 B.	Chatham	Thames Ironworks	1901	1903	1,009,835	7–3 K.S.	2–1	7	7 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4	18·6 *t*	900 2000	750
b.	**Albion** . .	12,950	390	74	26	13,885 B.	Blackwall	Maudslay	1898	1902	858,745	6–2 H.N.	3–1	6	12–8 H.N.	12–6 H.N.	5 H.N.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4	17·8 *t*	800 2300	700
a.c.	**Antrim** .	10,850	450	68½	25	21,604 Y. & cyl. 21,190 B. & W. & cyl.	Clydeb'nk	J. Brown	1903	1905	906,335*	6–2 H.N.	2–¾	..	4½ H.N.	6 H.N.	6 H.N.	4 *7·5-in.*, 6 *6-in.*, 1 *12-pr.*, 22 *3-pr.*, 2 M.	2	23·02 *t* 22·38 *t*	800 1950	655
a.c.	**Argyll** .						Greenock	Greenock Foundry	1904	1906	906,308*											

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a s.	**Bacchante** shd.	12,000	440	69½	26½	21,320 B.	Clydeb'nk	J. Brown	1901	1902	787,230	6–2 K.S.	3–1½	..	5 H.N.	6 K.S.	5	2 *9·2-in.*, 12 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 8 M., 2 l.	2	21·75 *t*	800 1600	755
b.	**Bellerophon** .	18,600	490	82	27	23,000 B. & W.	Portsm'th	Fairfield P.T.	1907	1909	1,765,342*	11–6–4 K.C.	..	8	..	11 K.C.	..	10 *12-in*, 16 *4-in.*, 5 M. .	3	21·80 *t*	900	870
a.c.	**Berwick** . .	9800	440	66	24½	22,681 Nic.	W. Beardmore & Co.	Humphrys	1902	1903	750,984	4–2 H.S.	2¾	..	5 N.S.	5–4 N.S.	4 N.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 9 M.G.	2	23·61 *t*	800 1600	537
a.c.	**Black Prince** .	13,550	480	73½	27	23,939 B. & W. & cyl.	Blackwall	Thames Ironworks	1904	1906	1,193,414*	6–4–3 K.S.	¾–1	6	6	6	6	6 *9·2-in.*, 10 *6-in.*, 25 *3-pr.*, 2 M.	3	23·65 *t*	1000 2000	704
b.	**Britannia** . .	16,350	425	78	26¾	18,725 B & W & cyl	Portsm'th	Humphrys	1904	1906	1,450,757*	9 H.S.	2–1	8·7	12 H.S.	12·6 H.S.	7 K.S.	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 14 *12-pr.*, 17 *3-pr.*, M.	4	18·74 *t*	950 2150	781
b.	**Bulwark** . .	15,000	400	75	26¾	15,000 B.	Devonp't	Hawthorn	1899	1902	997,846	9 H.S.	3–2	3 K.S.	12 H.S.	12–5 H.S.	6 2 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 8 *3-pr.*, & M.	4	18·15 *t*	900 2000	781
b.	**Cæsar** . .	14,900	390	75	27½	12,000	Portsm'th	Maudslay .	1896	1897	885,212	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 H.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 2 M., 2 l.	5	18·7 *t*	900 2000	757
b.	**Canopus** .	12,950	390	74	26	13,500 B.	Portsm'th	Greenock Foundry	1897	1899	866,516	6 H.N.	3–1	6 H.N.	12 H.N.	12–5 H.N.	5 H.N.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4	18·5 *t*	800 1850	700
a.c.	**Carnarvon** .	10,850	450	68½	25	21,489 Nic.&cyl.	Beardm're	Humphrys	1903	1905	890.840*	6–2 K.S.	2–¾	..	4½ K.S.	6 N.S.	6	4 *7·5-in.*, 6 *6-in.*, 1 *12-pr.*, 22 *3-pr.*, 2 M.	2	23·3 *t*	800	655
b.	**Centurion** ‡ .	23,000	555	89	27½	31,000	Devonp'rt	Hawthorn P.T.	Bldg.	..	..	12	..	9	..	10	..	10 *13·5-in.*, 24 *4*-in. . .	3	21	..	..
a.c.	**Cochrane** . .	13,550	480	73½	27	23,654 Y² & cyl	Govan .	Fairfield .	1905	1907	1,193,121*	6–4–3 K.S.	¾–1	6	6	6	6	6 *9·2-in.*, 4 *7·5-in.*, 1 *12-pr.*, 29 *3-pr.*, 2 M.	3	23·29 *t*	1000	704
b.	**Collingwood** .	19,250	500	84	27	24,500 Y²	Devonp't	Hawthorn P.T.	1908	1910	1,731,640*	10–6–4	¾–1¾	8	..	9	..	10 *12-in.*, 20 *4-in.*, 5 M. .	3	21·5 *t*	900	724
b.	**Colossus** . .	20,000	510	85	27	29,000 B. & W.	Greenock	Scott . P.T.	1910	1911	1,671,634*	11–3	2½	8	..	10	..	10 *12-in.*, 16 *4-in.* . . .	3	21·5 *t*	900	..

* Total estimated cost of ship including guns.

‡ Particulars doubtful.

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GREAT BRITAIN.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost	Armour. Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	**Commonwealth**	16,350	425	78	26¾	18,538 B&W & cyl	Govan	Fairfield	1903	1905	1,481,811*	9 H.S.	2–1	8–7	12 H.S.	12–6 H.S.	7 K.S.	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 14 *12-pr.*, 17 *3-pr.*, M.	4	19·01 *t*	950 2150	781
b.	**Conqueror**‡	22,500	545	88½	27½	27,000 Y²	Dalmuir	Beardmore P.T.	Bldg.	..	..	12	..	9	..	10	..	10 *13·5-in.*, 24 *4-in.*	3	21	1000 2700	..
a.c.	**Cornwall**	9800	440	66	24½	22,699 B. & W.	Pembroke	Hawthorn	1902	1904	756,274	4–2 H.S.	2–¾	..	5 N.S.	5–4 N.S.	4 N.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 9 M.	2	23·68 *t*	800 1600	537
b.	**Cornwallis**	14,000	405	75½	26½	18,238 B.	Blackwall	Thames S. Co.	1901	1904	1,030,302	7 K.S.	2–1	7	14 K.S.	11–6 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4	18·9 *t*	900 2000	750
a.c.	**Cressy** shd.	12,000	440	69½	26¼	21,240 B.	Govan	Fairfield	1899	1901	749,324	6 K.S.	3–2	..	5 K.S.	6 K.S.	5 K.S.	2 *9·2-in.*, 12 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 8 M., 2 l.	2	20·79 *t*	800 1600	755
a.c.	**Cumberland**	9800	440	66	24½	22,000 B.	Glasgow	London & Glasgow Co.	1902	1904	718,168	4–2 K.S.	2–¾	..	5	5–4	4 N.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 9 M.	2	23·68 *t*	800 1000	537
a.c.	**Defence**	14,600	490	74½	26	27,570 Y²	Pembroke	Scotts S. & E. Co.	1907	1909	1,383,744*	6–4	1–½	3	..	8	7	4 *9·2-in.*, 10 *7·5-in.*, 16 *12-pr.*, 5 M.	5	23·5 *t*	1000	755
a.c.	**Devonshire**	10,850	450	68½	25	21,475 Nic. & cyl.	Chatham	Thames Ironworks	1904	1905	850,877*	6–2	2–¾	..	4½ K.S.	6 N.S.	6	4 *7·5-in.*, 6 *6-in.*, 1 *12-pr.*, 22 *3-pr.*, 2 M.	2	22·97 *t*	800 1600	655
b.	**Dominion**	16,350	425	78	26¾	18,438 B. & W. & cyl.	Barrow	Vickers	1903	1905	1,455,190*	9 K.S.	2–1	8–7 K.S.	12 K.S.	12–6 K.S.	7	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 14 *12-pr.*, 17 *3-pr.*, M.	4	19·5 *t*	950 2150	781
a.c.	**Donegal**	9800	440	66	24½	22,173 B.	Govan	Fairfield Co.	1902	1903	715,947	4–2 K.S.	2–¾	..	5 K.S.	5–4	4 K.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 9 M.	2	23·56 *t*	800 1600	537
a.c.	**Drake**	14,100	500	71	26	31,450 B.	Pembroke	Humphrys	1901	1902	1,002,977	6 K.S.	3–2	..	5 K.S.	6–5 K.S.	5 K.S.	2 *9·2-in.*, 16 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 2 M.	2	24·11 *t*	1250 2500	900
b.	**Dreadnought**	17,900	490	82	26½	27,500 B. & W.	Portsm'th	Vickers P. T.	1906	1906	1,813,100*	11-6-4 K.C.	2¾–1¾	8	..	11	..	10 *12*-in., 24 *12-pr.* Q.F., 5 M.	5	21·85 *t*	900 2700	800

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a.c.	**Duke of Edinburgh**		13,550	480	73½	27	23,685 B. & W. & cyl.	Pembroke	Hawthorn Leslie	1904	1906	1,201,687*	6–4–3 K.S.	¾–1	6	6	6	6	6 *9·2-in.*, 10 *6-in.*, 25 *3-pr.*, 2 M.	3	22·84 *t*	1000	704
b.	**Duncan** . .		14,000	405	75½	26½	18,222 B.	Blackwall	Thames S. Co.	1901	1903	1,023,147	7 K.S.	2–1	7	14 K.S.	11–6 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4	18·9 *t*	900 2000	750
a.c.	**Essex** . .		9,800	440	66	24½	22,000 B.	Pembroke	J. Brown .	1901	1903	739,946	4–2 K.S.	2–¾	..	5	5	4 K.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 8 M., 2 L.	2	22·79 *t*	800 1600	537
a.c.	**Euryalus** .	shd.	12,000	440	69½	26¼	21,318 B.	Barrow .	Vickers .	1901	1904	782,901	6 K.S.	3–2	2	5 K.S.	6 K.S.	5 K.S.	2 *9·2-in.*, 12 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 8 M.	2	21·63 *t*	800 1600	755
b.	**Exmouth** . .		14,000	405	75½	26½	18,346 B.	Birkenh'd	Laird .	1901	1903	1,032,409	7 K.S	2–1	7	14 K.S.	11–6 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4	19·0	900 2000	750
b.	**Formidable** .		15,000	400	75	26¾	15,000 B.	Portsm'th	Earle .	1898	1901	1,022,745	9 H.S.	3–2	2	12 H.S.	12–5	8 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 8 *3-pr.*, & M.	4	18·13 *t*	900 2000	781
b.	**Glory** . .		12,950	390	74	26	13,500 B.	Birkenh'd	Laird .	1899	1901	841,014	6 H.N.	3–2	6 H.N.	12 H.N.	12–5 H.N.	5 H.N.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4	18·12 *t*	800 1850	700
b.	**Goliath** . .		12,950	390	74	26	13,500 B.	Chatham.	Penn .	1898	1900	866,006									18·4 *t*		
a.c.	**Good Hope** .		14,100	500	71	26	31,071 B.	Govan .	Fairfield .	1901	1902	990,759	6 K.S.	3–2	..	5 K.S.	6–5 K.S.	5 K.S.	2 *9·2-in.*, 16 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 2 M.	2	23·5 *t*	1250 2500	900
a.c.	**Hampshire** .		10,850	450	68½	25	21,508 Y. & cyl.	Elswick .	Hawthorn.	1903	1905	866,527*	6–2 K.S.	2–¾	..	5 K.S.	5–4 N.S.	..	4 *7·5-in*, 6 *6-in.*, 1 *12-pr.*, 22 *3-pr.*, 2 M.	2	23·47 *t*	800 1600	655
b.	**Hannibal** . .		14,900	390	75	27½	12,000	Pembroke	Harland .	1896	1897	906,799	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 H.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 2 M., 2 l.	5	18·0 *t*	900 2200	757
b.	**Hercules** ‡.		20,000	510	85	27	25,700 Y²	Jarrow .	Palmer P.T.	1910	1911	1,661,911*	11–3	2½	8	..	10	..	10 *12-in.*, 16 *4-in.*	3	21·5 *t*	900	..
b.	**Hibernia** .		16,350	425	78	26¾	18,000 B.&W. & cyl.	Devonp'rt	Harland & Wolff	1905	1906	1,444,828*	9 H.S.	2–1	8–7	12 H.S.	12–6 H.S.	7 K.S.	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 14 *12 pr.*, 17 *3-pr.*, & M.	4	19·0	950 2150	781
b.	**Hindustan**						18,521 B.&W. & cyl.	Clydeb'nk	J. Brown .	1903	1905	1,454,526*	9 K.S.	2–1	8–7	12 K.S.	12–6 N.S.	7 N.S.			19·01 *t*		
a.c.	**Hogue** .	shd.	12,000	440	69½	26¼	21,432 B.	Barrow .	Vickers .	1900	1902	749,809	6 K.S.	3	2 H.S.	5 K.S.	6 K.S.	5 K.S.	2 *9·2-in.*, 12 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 8 M., 2 l.	2	22·6 *t*	800 1600	755

* Total estimated cost of ship including guns.

‡ Particulars doubtful.

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GREAT BRITAIN.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
												Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.						£	in.	in.	in.	in	in.	in.			knots.	tons.	
b.	Illustrious	14,900	390	75	27½	12,000	Chatham	Penn	1896	1898	894,585	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 H.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 2 M., 2 l.	5	16·5 *t*	900 2200	757
b.	Implacable	15,000	400	75	26¾	15,000 B.	D'port	Laird	1899	1902	989,116	9 K.S.	3–2	2	12 K.S.	12–5 K.S.	6	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 8 *3-pr.*, & M.	4	18·2 *t*	900 2000	781
b.	Irresistible						Chatham	Maudslay	1898	1901	1,048,136											
c.b.	Invincible	17,250	530	78½	26	41,000 Y²	Elswick.	Humphrys P.T.	1907	1909	1,768,995*	6–4 K.C.	..	3	..	7	..	8 *12-in.*, 16 *4-in.*, 5 M.	5	25‡	1000	731
c.b.	Inflexible					41,000 Y²	Clydeb'k	J. Brown P.T.	1907	1908	1,728,229*											
c.b.	Indomitable					41,000 B. & W.	Govan .	Fairfield P.T.	1907	1908	1,761,080*											
c.b.	Indefatigable ¶	18,750	555	80	26½	43,000 B. & W.	Devonp'rt	J. Brown P.T.	1909	1911	1,536,769*	6–4	..	..	..	7	..	8 *12-in.*, 16 *4-in.*	2	25	1000	..
b.	Jupiter	14,900	390	75	27½	12,000	Clydeb'nk	Thomson .	1895	1897	902,011	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 2 M., 2 l.	5	18·4 *t*	900 2200	757
a.c.	Kent	9800	440	66	24½	21,000 B.	Portsm'th	Hawthorn	1901	1903	700,283	4–2 K.S.	2–¾	..	5 K.S.	5–4 N.S.	4 K.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 8 M., 2 l.	2	21·7 *t*	800 1600	537
b.	King Edward VII.	16,350	425	78	26¾	18,138 B. & W. & cyl.	Devonp'rt	Harland .	1903	1905	1,473,245*	9 K.S.	2–1	8–7 K.S.	12 K.S.	12–6 N.S.	7	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 14 *12-pr.*, 17 *3-pr.*, M.	4	19·04 *t*	950 1200	781
b.	King George V. ¶	23,000	555	89	27½	31,000	Portsm'th	Parsons P.T.	Bldg.	..	..	12	..	9	..	10	..	10 *13·5-in.*, 24 *4-in.*	3	21	..	..
a.c.	King Alfred	14,100	500	71	26	30,893	Barrow .	Vickers	1901	1903	978,125	6-5-4 K.S.	2½–1	..	5 K.S.	6–5 K.S.	5 K.S.	2 *9·2-in.*, 16 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 2 l.	2	23·46 *t*	1250	813
	Leviathan					31,203 B.	Clydeb'nk	J. Brown			1,012,959									23·28 *t*	2500	

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a.c.	**Lancaster**	9800	440	66	24½	22,000 B.	Elswick	Hawthorn	1902	1904	732,858	4–2 K.S.	2–¾		5 K.S.	5–4 N.S.	4 K.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 9 M.	2	24·01 *t*	800 1600	537
c.b.	**Lion**¶	26,350	660	88½	28	70,000 Y²	Devonport	Vickers P.T.	1910	..	..	9	..	6	..	9	..	8 *13·5-in.*, 16 *4-in.*	2	28	..	..
b.	**London**	15,000	400	75	26½	15,000 B.	Portsm'th	Earle	1899	1902	1,036,393	9 K.S.	3–2	2	12 K.S.	12–5 K.S.	6	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 8 *3-pr.*, & M.	4	18·1 *t*	900 2000	781
b.	**Lord Nelson**	16,500	410	79½	27	16,750 B. & W.	Jarrow	Palmer	1906	1908	1,654,098*	12-6 K.C.		8	8	12	..	4 *12-in.*, 10 *9·2-in.*, 24 *12-pr.*, 5 M.	5	18·9 *t*	900 2200	747
b.	**Magnificent**	14,900	390	75	27½	12,000	Chatham	Penn	1894	1895	908,789									17·6 *t*		
b.	**Majestic**	14,900	390	75	27½	12,000	Portsm'th	Barrow	1895	1895	916,382	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 2 M., 2 l.	5	17·9 *t*	900 2200	757
b.	**Mars**	14,900	390	75	27½	12,000	Birkenh'd	Laird	1896	1897	902,402									17·7 *t*		
a.c.	**Minotaur**	14,600	490	74½	26	27,856 B. & W.	Devonp'rt	Harland & Wolff	1906	1908	1,438,065*	6–4	1–½	6	..	8	7	4 *9·2-in.*, 10 *7·5-in.*, 16 *12-pr.*, 5 M.	5	23·01 *t*	1000	755
b.	**Monarch** ¶	22,500	545	88½	27½	27,000 B. & W.	Elswick	Hawthorn P. T.	1911	..	..	12	..	9	..	10	..	10 *13·5-in.*, 24 *4-in.*	3	21	1000 2700	..
a.c.	**Monmouth**	9800	440	66	24½	22,000 B.	Glasgow	London & Glasgow	1901	1903	979,591	4–2 K.S.	2–¾	4 K.S.	5 K.S.	5–4 N.S.	4 K.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 8 M., 2 l.	2	22·58 *t*	800 1600	537
a.c.	**Natal**	13,550	480	73½	27	23,592 Y² & Cyl.	Barrow	Shipbg.Co. Vickers	1905	1907	1,218,244*	6–4–3 K.S.	¾–1	6	6	6	6	6 *9·2-in.*, 4 *7·5-in.*, 1 *12-pr.*, 29 *3-pr.*, 2 M.	3	23·33 *t*	1000	704
b.	**Neptune**	19,900	510	85	27	27,721 Y²	Portsm'th	Harland & Wolff† P.T.	1909	1911	1,715,258*	10 3	2½	8	..	9	..	10 *12-in.*, 16 *4-in.*	3	21·78 *t*	900	..
b.	**New Zealand**	16,350	425	78	26¾	18,440 Nic. & Cyl.	Portsm'th	Humphrys	1904	1905	1,424,375*	9 K.S.	2–1	8–7 K.S.	12 K.S.	12–6 K.S.	7	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 14 *12-pr.*, 17 *3-pr.*, M.	4	18·59 *t*	950 2150	781
c.b.	**New Zealand**¶. (New)	18,800	555	80	26½	43,000	Govan	Fairfield	Bldg.	..	..	..	..	..	..	..	..	8 *12-in.*, 16 *4-in.*	2	25	1000	..
b.	**Ocean**	12,950	390	74	25½	13,500 B.	Devonport	Hawthorn	1898	1900	883,778	6 H.N.	2–1	6	12 H.N.	12–5 H.N.	5 H.N.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4 (4 sub.)	18·74 *t*	800 1850	700
b.	**Orion**¶	22,500	545	88½	27½	27,000 B. & W.	Portsm'th	Wallsend P. T.	1910	..	..	12	..	9	..	10	..	10 *13·5-in.*, 24 *4-in.*	3	21	1000 2700	..

* Estimated cost of ship including guns.

† By arrangement with John Brown & Co.

‡ Exceeded on trial.

¶ Particulars uncertain.

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GREAT BRITAIN.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
												Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.						£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	**Prince George**	14,900	390	75	27½	12,000	Portsm'th	Humphrys	1895	1896	895,504	9 H.S.	4–2½	9	14–9 H.S.	14–6 H.S.	6	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 2 l.	5	18·3 *t*	900 2200	757
b.	**Prince of Wales**	15,000	400	75	26¾	15,000 B.	Chatham	Greenock Foundry	1902	1904	1,114,079	9 K.S.	2–1	3	12 K.S.	12-6 N.S.	6–2 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 8 *3-pr.*, & M.	4	18·0	900	781
c.b.	**Princess Royal** ¶	26,350	660	88½	28	70,000 Y²	Barrow	Vickers P.T.	Bldg.	..	..	9	..	6	..	9	..	8 *13·5-in.*, 16 *4-in.*	2	28	..	..
c.b.	**Queen Mary** ¶	27,000	660	87	28	75,000	Jarrow	J. Brown	Bldg.	..	..	9	..	6	..	9	..	8 *13·5-in.*, 16 *4-in.*	2	28	..	..
b.	**Queen**	15,000	400	75	26¾	15,000 B. & W.	Devonport	Harland & Wolff	1902	1904	1,074,999	9 K.S.	2–1	3	12 K.S.	12–6 N.S.	6–2 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 8 *3-pr.*, & M.	4	18·39 *t*	900	781
b.	**Renown** shd.	12,350	380	72	26¾	12,000	Pembroke	Maudslay	1895	1896	709,706	8–6 H.S.	3–2	..	10–6 H.S.	10 H.S.	6–2	4 *10-in.*, 10 *6-in.*, 12 *12-pr.*, 10 *3-pr.*, 2 M., 2 l.	5 (2 sub.)	18·75 *t*	900 1450	674
a.c.	**Roxburgh**	10,850	450	68½	25	22,102 D. & cyl.	Glasgow	London & Glasgow Company	1904	1905	862,077*	6–2 K.S.	2–¾	..	4½ K.S.	6 N.S.	6	4 *7·5-in.*, 6 *6-in.*, 1 *12-pr.*, 22 *3-pr.*, 2 M.	2	23·63 *t*	800 1600	655
b.	**Russell**	14,000	405	75½	26½	18,229 B.	Jarrow	Palmer	1901	1903	1,037,995	7 K.S.	2·1	7 K.S.	14 K.S.	11–6 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4	19·3 *t*	900 2000	750
b.	**St. Vincent**	19,250	500	84	27	24,500 B. & W.	Portsm'th	Scott's S. P.T.	1908	1910	1,754,615*	10	¾–1¾	8	..	9	..	10 *12-in.*, 20 *4-in.*, 5 M.	3	21·9 *t*	900	724
a.c.	**Shannon**	14,600	490	75½	25	28,553 Y²	Chatham	Humphrys	1906	1908	1,423,410*	6–4	1–½	3	..	8	..	4 *9·2-in.*, 10 *7·5-in.*, 16 *12-pr.*, 5 M.	5	22·49 *t*	950	755
a.c.	**Suffolk**	9800	440	66	24½	22,000 Nic.	Portsm'th	Humphrys	1903	1904	722,681	4–2 K.S.	2–¾	..	5 K.S.	5–4 N.S.	4 K.S.	14 *6-in.*, 8 *12-pr.*, 5 *3-pr.*, 9 M.	2	24·7 *t*	800 1600	537
a.c.	**Sutlej** shd.	12,000	440	69½	26¼	21,261 B.	Clydeb'nk	J. Brown	1899	1902	755,690	6 K.S.	3–2	..	5 K.S.	6 K.S.	5 K.S.	2 *9·2-in.*, 12 *6-in.*, 12 *12-pr.*, 5 *3-pr.*, 8 M., 2 l.	2	21·77 *t*	800 1600	755

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b.	**Superb**	18,600	490	82	27	23,000 B. & W.	Elswick	Wallsend P. T.	1907	1909	1,660,446*	11-6-4 K.C.	..	8	..	11 K.C.	..	10 *12-in.*, 16 *4-in.* B.L., 5 M.	3	21·6 *t*	900	870
b.	**Temeraire**					23,000 Y²	Devonport	Hawthorn P. T.	1907	1909	1,743,955*									22·07 *t*		
b.	**Swiftsure**	11,800	436	71	24½	12,500	Elswick	Humphrys, Tennant	1903	1904	845,036	7	3	7	..	10	7 K.S.	4 *10-in.*, 14 *7·5 in.*, 14 *14-pr.*, 2 *12-pr.*, 8 *6-pr.*, & M.	2	19·6 *t*	800 2000	700
b.	**Triumph**						Barrow	Vickers	1903	1904	845,479											
b.	**Thunderer** ¶	22,500	545	88½	27½	27,000 B. & W.	Blackwall	Thames Ironworks P. T.	1911	..	..	12	..	9	..	10	..	10 *13·5-in.*, 24 *4-in.*	3	21	1000 2700	..
b.	**Vanguard**	19,250	500	84	27	24,500 B. & W.	Barrow	Vickers P. T.	1909	1910	1,607,781*	10	¾–1¾	8	..	9	..	10 *12-in.*, 20 *4-in.*, 5 M.	3	22·1 *t*	900	724
b.	**Venerable**	15,000	400	75	26¾	15,345 B.	Chatham	Maudslay	1899	1902	1,092,753	7 K.S.	4–2½	3	14 K.S.	11–6 K.S.	6–2	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 8 *3-pr.*, & M.	4	18·3 *t*	900 2000	781
b.	**Vengeance**	12,950	390	74	26	13,500 B.	Barrow	Vickers	1899	1901	836,417	6 K.S.	2–1	6	12 K.S.	12–6 K.S.	5 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 8 *3-pr.*, & M.	4	18·5 *t*	800 1850	750
b.	**Victorious**	14,900	390	75	27½	12,000	Chatham	Hawthorn	1895	1897	885,212	9 H.S.	3–2½	9	14–9 H.S.	14–6 H.S.	6	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 6 *3-pr.*, 8 M., 2 l.	5 (4 sub.)	18·7 *t*	900 2200	757
a.c.	**Warrior**	13,550	480	73½	27	23,641 Y² & cyl.	Pembroke	Wallsend	1905	1907	1,186,395*	6–4–3 K.S.	¾–1	6	6	6	6	6 *9·2-in.*, 4 *7·5-in.*, 1 *12-pr.*, 29 *3-pr.*, 2 M.	3	22·9 *t*	1000	704
	5 Armoured ships‡	Details not published.					1 Portsmouth 1 Devonport 3 by contract.		Pro.															

* Total estimated cost of ship, including guns. ‡ Programme 1911–12. ¶ Particulars uncertain

The battleships Nile (1888), **Trafalgar** (1887), **Hood, Empress of India, Royal Sovereign** (1891), **Ramillies, Repulse, Resolution, Revenge** and **Royal Oak** (1892) are still retained in the Navy List. It was officially announced on March 16, 1911, that five Royal Sovereigns will be sold or otherwise disposed of during 1911.

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GREAT BRITAIN.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
												Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.						£	in.	in			knots.	tons.	
P. 3rd cl. Cr.	**Active** . .	3440	385	41½	13¾	18,000 Y.	Pembroke	Hawthorn. P.T.	1911	..	..	..	..	10 *4-in.* B.L., and M. .	2	25·0	450	..
„ „	**Amphion** . .	3440	385	41½	13¾	18,000 Y.	Pembroke	Hawthorn. P.T.	Bldg.	..	..	..	..	10 *4-in.* B.L., and M. .	2	25·0	450	..
Scout. .	**Adventure** .	2670	374	38¼	13½	15,850 Y mod.	Elswick .	Hawthorn.	1904	1905	270,263	2	¾	10 *12-pr.*, 8 *3-pr.* .	2	25·42 *t*	150	268
P. 3rd cl. Cr.	**Æolus** . shd.	3600	300	43	17½	9000	Devonp'rt	Hawthorn.	1891	1893	213,180	2–1	2	2 *6-in.*, 6 *4·7-in.*, 13 *6-pr.*, *3-pr.*, M.	3	19·75	400 535	273
„ „	**Amethyst** . .	3000	360	40	14½	14,200 Y mod.	Elswick .	Parsons P.T.	1903	1905	228,426	..	..	12 *4-in.*, 11 *3-pr.*, M. .	2	23·42 *t*	300	296
P. 1st cl. Cr.	**Amphitrite** shd.	11,000	435	69	25¼	18,000 B.	Barrow .	Vickers .	1898	1900	552,795	4	3 6 H. S.	16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 M.	2 (1 sub.)	20·75	1000	677
„ „	**Andromeda** shd.	11,000	435	69	25¼	16,500 B.	Pembroke	Hawthorn.	1897	1900	574,916	3–6	3–6 H.S.	16 *6-in.*, 12 *12-pr.*, 4 *3-pr.*, 2 M.	2	20·5	1000	600
„ „	**Argonaut** . shd.	11,000	435	69	25¼	18,000 B.	Govan .	Fairfield .	1898	1900	545,756	4	3–6 H. S.	16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 M.	2 (1 sub.)	20·75	1000	677
„ „	**Ariadne** . shd.	11,000	435	69	25¼	18,000 B.	Clydeb'nk	J. Brown .	1898	1900	541,927							
P. 3rd cl. Cr.	**Astræa** . shd.	4360	320	49½	19	9112	Devonp'rt	Devonport	1893	1894	254,217	2–1	3	2 *6-in.*, 8 *4·7-in.*, 1 *12-pr.*, 13 *6-pr.*, *3-pr.*, M.	3	19·75	400	312
Scout . .	**Attentive** . .	2670	374	38¼	13½	16,212 Y.	Elswick .	Hawthorn .	1904	1906	270,263	2	¾	10 *12-pr.*, 8 *3-pr.* .	2	25·88 *t*	150	268
P. 3rd cl. Cr.	**Barham** . .	1830	280	35	13¼	4700 T.	Portsm'th	Hawthorn .	1889	1890	113,702	2–1	2	6 *4·7-in.*, 6 *3-pr.*, M.	2	18·6	140	169
P. 3rd cl. Cr.	**Bellona** . .	3360	385	41½	13¾	18,000 Y.	Pembroke	Fairfield . P.T.	1909	1910	283,038*	½–1	..	6 *4-in.* B L., and M. .	2	25·9 *t*	450	263

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P. 3rd cl. Cr.	Blanche		3360	385	41½	13¼	18,542 Y.	Pembroke	Hawthorn. P.T.	1909	1910	288,482*	..	..	10 4-*in.* B.L. and M.	2	25·67 *t*	350	292
„ „	Blonde		3360	385	41½	13¼	18,770 Y.	Pembroke	Cammell Laird P.T.	1910	..	287,413*	..	..	10 4-*in.* B.L. and M.	2	25·43 *t*	350	292
„ „	Boadicea		3300	385	41	13½	18,000 Y.	Pembroke	J. Brown P.T.	1908	1909	330,631*	½–1	..	6 4-*in.*, B.L. and M.	2	25·75 *t*	450	263
„ „	Brilliant	shd.	3600	300	43¾	17½	9164	Sheerness	Hawthorn.	1891	1893	218,145	2–1	2	2 6-*in.*, 6 4·7-*in.*, 1 3 6-*pr.*, 3-*pr.*, M.	3	19·7	400	273
P. 2nd cl. Cr.	Bristol		4800	430	47	15¼	24,529 Y.	Clydeb'nk	J. Brown C.T.	1910	1910	364,953*	2–1	..	2 6-*in.*, 10 4-*in.* B.L., 12-*pr.*, 4 M.	2	26·84	650	376
P. 3rd cl. Cr.	Cambrian.	shd.	4360	320	49½	19	9000	Pembroke	Hawthorn.	1893	1894	244,725	2–1	2	2 6-*in.*, 8 4·7-*in.*, 1 12-*pr.*, 13 6-*pr.*, 3-*pr.*, M.	3	19·5	400	312
P. 2nd cl. Cr.	Challenger		5880	355	56	21¼	12,500 B.&W	Chatham	Wallsend Eng'ng Co.	1902	1904	360,194	3–2	..	11 6-*in.*, 9 12-*pr.*, 1 3-*pr.*, 2 M.	2	21·0	500	454
P. 3rd cl. Cr.	Charybdis	shd.	4360	320	49½	19	9000	Sheerness	Earle	1893	1895	241,029	2–1	2	2 6-*in.*, 8 4·7-*in.*, 1 12-*pr.*, 13 6-*pr.*, 3-*pr.*, M.	3	19·5	400	312
P. 2nd cl Cr.	Chatham		5400	430	49½	15¾	25,000 Y.	Chatham.	Thames Ironworks P.T.	Bldg.	..	..	..	..	8 6-*in.*, 4 3-*pr.*, 4 M., 1 l.	2	25·5	..	..
P. „ „	Crescent	shd.	7700	360	60	23¾	12,000	Portsm'th	Penn	1892	1894	392,453	5–1	6	1 9·2-*in.*, 12 6-*in.*, 1 12-*pr.*, 19 6-*pr.*, 3-*pr.*, M.	2 (1 sub.)	19·7	850	560
P. „ „	Dartmouth		5250	430	48½	15½	22,000 Y.	Barrow	Vickers P.T.	1911	..	334,847*	..	..	8 6-*in.*, 4 3-*pr.*, 4 M.	2	24·75	650	390
P. 1st cl. Cr.	Diadem	shd.	11,000	435	69	26	16,500 B.	Govan	Fairfield	1896	1899	554,863	4–2½	4½–2	16 6-*in.*, 12 12-*pr.*, 3 3-*pr.*, 2 M.	2 (1 sub.)	20·5	1000	357
P. 3rd cl. Cr.	Diamond		3000	360	40	14½	10,066 N. L.	Birkenh'd	Laird	1904	1905	231,010	..	..	12 4-*in.*, 11 3-*pr.*, M.	2	22·17 *t*	300	296
P. 2nd cl. Cr.	Diana	shd.	5600	350	54	21	9600	Govan	Fairfield	1895	1898	253,009	2½	3	11 6-*in.*, 9 12-*pr.*, 1 3-*pr.*, 5 M., 1 l.	3	19·5	550	449
„ „	Dido	shd.	5600	350	54	21	9600	Glasgow	London and Glasgow Co.	1896	1898	254,190				3 (2 sub.)	19·5	550	449
„ „	Doris	shd.	5600	350	54	21	9600	Barrow	Vickers	1896	1898	256,306							

* Total estimated cost of ship including guns.

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GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
												Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
P. 2nd cl. Cr.	Dublin . .	5400	430	49½	15¾	25,000 Y.	Dalmuir .	Beardmore P. T.	Bldg.	..	..	..	..	8 *6-in.*, 4 *3-pr.*, 4 M., 1 l.	2	25·5	..	..
„ „	Eclipse . shd.	5600	350	53	20¼	9600	Portsm'th	Portsm'th	1894	1897	276,313	1½–3	3	5 *6-in.*, 6 *4·7in.*, 9 *12-pr.*, 1 *3-pr.*, 5 M., 1 l.	3	19·5	550	456
„ „	Edgar . .	7350	360	60	23¾	12,000	Devonp'rt	Fairfield .	1890	1893	410,980	5–1	6	2 *9·2-in.*, 10 *6-in.*, 2 *12-pr.*, 19 *6-pr.*, *3-pr.*, M.	4	20·5	850	544
„ „	Encounter .	5880	375	56	20¼	12,500 Dürr	Devonp'rt	Devonport Dockyard .	1903	1906	370,275	3–2	..	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 2 M.	2	20·75 to 21·0	600	454
„ „	Endymion .	7350	360	60	23¾	12,000	Hull .	Earle .	1891	1894	375,350	5–1	6	2 *9·2-in.*, 10 *6-in.*, 1 *12-pr.*, 19 *6-pr.*, *3-pr.*, M.	2	20·5	850	544
P. 1st cl. Cr.	Europa . shd.	11,000	435	69	26	16,500 B.	Clydeb'nk	Thomson .	1897	1899	564,690	4–2½	4½–2	16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 M.	2	20·5	1000	357
P. 2nd cl. Cr.	Falmouth . .	5250	430	48½	15½	22,000 Y.	Dalmuir .	Beardmore P. T.	1910	..	339,274*	..	..	8 *6-in.*, 4 *3-pr.*, 4 M.	2	24·75	650	390
P. 3rd cl. Cr.	Flora . shd.	4360	320	49½	19	9000	Pembroke	Vickers .	1893	1895	242,276							
„ „	Forte. . shd.	4360	320	49½	19	9000	Chatham	Chatham .	1893	1895	240,571	2–1	2	2 *6-in.*, 8 *4·7-in.*, 1 *12-pr.*, 13 *6-pr.*, *3-pr.*, M.	3	19·5	400	312
„ „	Fox . . shd.	4360	320	49½	19	9000	Portsm'th	Portsm'th	1893	1895	245,571							
Scout . . .	Foresight .	2850	360	39	14	14,277 T.	Govan .	Fairfield .	1904	1905	285,672	1½–⅝	..	14 *12-pr.* . .	2	25·12 *t*	150	268
„ .	Forward .					15,018 T.					285,326					25·15 *t*	380	
P. 2nd cl. Cr.	Furious . shd.	5750	320	57½	21	10,000 B.	Devonp'rt	Earle .	1896	1899	275,158	1–2	3	10 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 5 M., 1 l.	2	19·0	500	459

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P. 2nd cl. Cr.	**Gibraltar**	shd.	7700	360	60	23¾	12,000	Glasgow	Napier	1892	1894	373,236	5–1	6	2 *9·2-in.*, 10 *6-in.*, 1 *12-pr.*, 19 *6-pr.*, *3-pr.*, M.	2	19·7	850	544
„ „	**Glasgow**		4800	430	47	15½	22,472 *t*	Govan	Fairfield P. T.	1909	1910	354,884*	2–1	..	2 *6-in.*, 10 *4-in.*, 1 *12-pr.*, 4 M.	2	25·8 *t*	650	376
„ „	**Gloucester**						23,757 *t*	Dalmuir	Beardmore P. T.			353,856*					26·29 *t*		
„ „	**Grafton**		7350	360	60	23¾	12,000	Blackwall	Humphrys	1892	1894	372,890	..	6	2 *9·2-in.*, 10 *6-in.*, 1 *12-pr.*, 19 *6-pr.*, *3-pr.*, M.	2	20·0	850	560
„ „	**Hawke**		7350	360	60	23¾	12,000	Chatham	Fairfield	1891	1893	400,702	5–1	6	2 *9·2-in.*, 10 *6-in.*, 1 *12-pr.*, 19 *6-pr.*, *3-pr.*, M.	2	20·0	850	544
„ „	**Hermes**	shd.	5600	350	54	20½	10,000 B.&W.	Govan	Fairfield	1898	1900 1902	281,776	1½–3	3	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 2 M.	2	20·0	600	456
„ „	**Highflyer**	shd.	5600	350	54	20½	10,000 B.	Govan	Fairfield	1898	1900	280,182							
„ „	**Hyacinth**	shd.	5600	350	54	20½	10,000 B.	Glasgow	London and Glasgow Co.	1898	1901	288,595							
P. 3rd cl. Cr.	**Hermione**	shd.	4360	320	49½	13	9000	Devonp'rt	Thomson	1893	1895	223,324	2–1	2	2 *6-in.*, 8 *4·7-in.*, 1 *12-pr.*, 13 *6-pr.*, *3-pr.*, M.	3	19·5	400	312
T. G. B.	**Hussar**		1070	250	30½	9	3500	Devonp'rt	Hawthorn	1894	1895	72,313	..	2	2 *4·7-in.*, 5 *6-pr.*, M.	5	19·0	100	120
P. 2nd cl Cr.	**Isis**	shd.	5600	350	54	21	9600	Glasgow	London and Glasgow Co.	1896	1898	253,733	2½	3	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 5 M., 1 l.	3 (2 sub.)	19·5	550	449
„ „	**Juno**	shd.	5600	350	54	21	9600	Barrow	Vickers	1895	1898	256,106							
„ „	**Liverpool**		4800	430	47	15¼	24,614 Y.	Barrow	Vickers P.T.	1909	1910	344,871*	2–1	..	2 *6-in.*, 10 *4-in.* B.L., 1 *12-pr.*, 4 M.	2	26·17 *t*	650	376
3rd cl. Cr.	**Medea**		2800	265	41	16½	7500 Y.	Chatham	Humphrys	1888	1889 1905	171,874	..	1½	6 *4·7-in.*, 13 *6-pr.*, *3-pr.*, M.	4	19·0	400	218
P. 3rd cl. Cr.	**Melpomene** (*ex*-Indefatigable)	shd.	3600	300	43¾	17½	9000	Glasgow	London and Glasgow Co.	1891	1892	183,568	2–1	2	2 *6-in.*, 6 *4·7-in.*, 13 *6-pr.*, *3-pr.*, M.	3	19·75	400	273

* Total estimated cost of ship, including guns.

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GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Makers of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
												Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
P. 2nd cl. Cr.	**Minerva** . shd.	5600	350	53	20½	9600	Chatham.	Chatham .	1895	1897	275,331	1½-3	3	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 5 M., 1 l.	3 (2 sub.)	19·5	550	416
„ „	**Newcastle** .	4800	430	47	15¼	24,669 Y.	Elswick .	Wallsend Engineering Co. P.T.	1909	1910	352,610*	2–1	..	2 *6-in.*, 10 *4-in.* B.L., 1 *12-pr.*, 4 M.	2	26·26 *t*	650	376
P. Scout .	**Pathfinder**	2940	370	38¾	14	17,176 L.N.	Birknhd.	Laird .	1904	1905	273,147	½–⅝	..	10 *12-pr.*, 8 *3-pr.* .	2	25·34 *t*	150	268
„ .	**Patrol** .					16,460					273,523					25·06 *t*	380	
P. 3rd cl. Cr.	**Pandora** . .	2200	305	36¾	13½	7000 T.	Portsm'th	Portsm'th	1900	1901	165,218							
„ „	**Pegasus** . .	2135	300	36½	17	7000 R.	Jarrow .	Palmer .	1897	1899	134,919							
„ „	**Pelorus** . .	2135	300	36½	17	7000 Nor.	Sheerness	Thomson .	1896	1897	154,315							
„ „	**Perseus** . .	2135	300	36½	13½	7000 T.	Hull	Earle .	1897	1901	133,461							
„ „	**Pioneer** . .	2200	305	36¾	13½	7000 T.	Chatham.	Fairfield .	1899	1900	148,894	2	·22	8 *4-in.*, 11 *3-pr.*, M. .	2	20·0	250 517	234
„ „	**Prometheus** .	2135	300	36½	13½	7000 T.	Hull .	Earle .	1898	1901	131,743							
„ „	**Psyche** . .	2200	305	36¾	17½	7000 T.	Devonp'rt	Devonport	1898	1900	156,890							
„ „	**Proserpine** .	2135	300	36½	17	7000 T.	Sheerness	Devonport	1896	1899	165,020							
„ „	**Pyramus** .	2135	300	36½	13½	7000 R.	Jarrow .	Palmer .	1897	1900	135,249							
„ „	**Philomel** . .	2575	265	41	15½	7500	Devonp'rt	Earle .	1890	1892	163,699	2–1	2	8 *4·7-in.*, 12 *3-pr.*, M.	2	19·0	300	217

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P. 2nd cl. Cr.	**Royal Arthur** shd.	7700	360	60	27⅞	12,000	Portsm'th	Maudslay .	1891	1893	412,033	5–1	6	1 *9·2-in.*, 12 *6-in.*, 1 *12-pr.*, 19 *6-pr.*, *3-pr.*, M.	2 (2 sub.)	19·7	850	567
P. 3rd cl. Cr.	**Sapphire** . .	3000	360	40	14½	10,200	Jarrow .	Palmer .	1904	1905	226,277	..	..	12 *4-in.*, 11 *3-pr.*, M. .	2	22·45 *t*	300	296
„ „	**Sappho** . .	3400	300	43	16½	9861	Poplar .	Penn	1891	1893	176,813	2–1	2	2 *6-in.*, 6 *4·7-in.*, *6-pr.*, 13 *3-pr.*, M.	4	20·47	400	273
„ „	**Scylla** . .	3400	300	43	16½	9280	Poplar .	Penn .	1892	1893	176,655	2–1	2		4	20·62	400	273
P. Scout .	**Sentinel** . .	2895	360	40	14½	17,488 Nor. V.E.	Barrow .	Vickers .	1904	1905	276,344	1½–⅝	..	10 *12-pr.*, 8 *3-pr.* . .	2	25·07 *t*	150/410	268
P. 3rd cl. Cr.	**Sirius** . shd.	3600	300	43¾	17½	9000	Elswick .	Maudslay .	1890	1892	190,991	2–1	2	2 *6-in.*, 6 *4·7-in.*, 13 *6-pr.*, *3-pr.*, M.	4	19·75	400	273
P. Scout .	**Skirmisher** .	2895	360	40	14½	17,053 Nor.	Barrow .	Vickers .	1905	1905	276,579	1½–⅝	..	10 *12-pr.*, 8 *3-pr.* .	2	25·19	150	268
P. 2nd cl. Cr.	**Southampton** .	5400	430	49½	15¾	25,000 Y.	Clydeb'nk	J. Brown C.T.	Bldg.	..	..	..	..	8 *6-in.*, 4 *3-pr.*, 4 M., 1 l.	2	25·5	..	..
P. 1st cl. Cr.	**Spartiate** . shd.	11,000	435	69	26	18,658	Pembroke	Maudslay .	1898	1902	654,661	4–2½	4½–2	16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 M.	2 (2 sub.)	21·0 *t*	1000	600
T. B. D. .	**Swift.** . .	1800	345	34⅛	10½	30,000 L.Y.	Birkenh'd	Cammell Laird	1907	1909	241,595*	..	..	4 *4-in.* . . .	..	35·25	180 Oil	150
P. 2nd cl. Cr.	**Talbot** . shd.	5600	350	53½	21	9600	Devonpr't	Devonport	1895	1897	263,699	1½–3	3	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 5 M., 1 l.	3 (2 sub.)	19·5	550	412
P. 3rd cl. Cr	**Terpsichore** .	3400	300	43	16½	9000	Glasgow .	Thomson .	1890	1892	176,616	2–1	2	2 *6-in.*, 6 *4·7-in.*, 13 *6-pr.*, *3-pr.*, M.	3	20·0	400	275
P. 1st cl. Cr.	**Terrible** . shd.	14,200	500	71	27	25,000 B.	Glasgow .	Thomson .	1895	1898	708,619	3–6	6	2 *9·2-in.*, 16 *6-in.*, 14 *12-pr.*, 14 *3-pr.*, 9 M.	4	22·4	1500/3000	840
P. 2nd cl. Cr.	**Theseus** . .	7350	360	60	23¾	12,000	Blackwall	Maudslay .	1892	1894	370,359	5–1	6	2 *9·2-in.*, 10 *6-in.*, 1 *12-pr.*, 19 *6-pr.*, *3-pr.*, M.	2 (2 sub.)	20·0	850	544

* Total estimated cost of ship, including guns.

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GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
P. 3rd cl. Cr.	**Topaze** . .	3000	360	40	14½	9860 L.N.	Birkenh'd	Laird .	1903	1905	242,444	..	..	12 *4-in.*, 11 *3-pr.*, M.	2	22·1 *t*	300	296
P. 2nd cl. Cr.	**Venus** . shd.	5600	350	54	21¼	9600	Govan .	Fairfield .	1895	1898	254,184	2½	3	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 5 M., 1 I.	3 (2 sub.)	19·5	550	449
„ „	**Vindictive** .	5750	320	54	20½	10,000 B.	Chatham	Chatham .	1897	1897	282,879	1–2 N.S.	3	10 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 5 M., 1 I.	2	20·1	500	429
„ „	**Weymouth**	5250	430	48½	15½	22,000 Y.	Elswick	Parsons P. T.	1910	..	341,864*	..	..	8 *6-in.*, 4 *3-pr.*, 4 M.	2	24·75	650	390
„ „	**Yarmouth**						Glasgow	London & Glas. Co. C. T.	Bldg.		354,465*							
	3 Protected Cruisers 1 Unarmoured Cruiser	Details not published.‡					..	..	Pro.	..	..	..	..	..	..	..	..	..

* Total cost, including guns.

‡ Programme 1911–12.

River Gunboats.—**Robin, Nightingale, Snipe, Sandpiper** (1897), 85 tons; **Woodcock, Woodlark** (1898), 150 tons, 2 6-prs., 4 Maxims; **Kinsha** (1901), 616 tons, **Teal, Moorhen** (1902), 180 tons, 2 6-prs., 13 knots; **Widgeon** (1905), 195 tons. *Despatch Vessels.*—**Alacrity** and **Surprise** (1885), 1,700 and 1,650 tons. *Torpedo Gunboats* (some serving as mine sweepers).—**Circe, Gossamer, Dryad, Halcyon, Harrier, Jason, Leda, Niger, Seagull, Skipjack, Spanker, Speedwell,** and **Speedy.**

The following vessels have been struck off the effective list, but the armaments have not in every case been removed:—*Cruisers:* **Powerful** (to be used for harbour service), **Arrogant** and **Pactolus** (refitting as submarine depot ships), and **Spartan.** The following small craft have been placed on a "Special Service List" of "unprotected ships": **Sphinx, Lapwing, Redbreast** (East Indies), **Ringdove** (Fishery P.), **Pomone** (special service), **Dwarf** (W. C. Africa), **Shearwater** (British Columbia), **Bramble, Britomart, Thistle, Clio,** and **Cadmus** (China).

The following vessels are employed on special service:—**Assistance** and **Cyclops,** fleet repair ships: **Blake, Blenheim, Hecla, Leander, St. George,** and **Tyne,** torpedo depôt ships; **Bonaventure, Forth, Mercury, Thames, Vulcan, Dolphin, Onyx, Antelope, Hebe, Sharpshooter,** and **Hazard,** submarine depôt ships; **Aquarius,** distilling vessel; **Iphigenia, Apollo, Naiad, Intrepid, Andromache, Latona,** and **Thetis,** mine-laying vessels; and **Seaflower, Seamew, Sparrow, Spider,** and **Driver,** steam-trawlers for mine-sweeping duties, purchased April, 1909.

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Defence Forces of the Dominions.

AUSTRALIA.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
c.b.	Australia	tons. 18,800	ft. 555	ft. 80	ft. 26½	43,000	Clydebank	J. Brown	Bldg.	..	£ ..	in. ..	in. ..	8 *12*-in., 16 *4-in.*	2	knots. 25·0	tons. 1000	..
P. 2nd cl. Cr.	Melbourne	5400	430	49½	15¾	25,000	Birkenhead	Cammell Laird	Bldg.	..	..	..	..	8 *6*-in., 4 *3-pr.*, 4 M., 1 1.	2	25·5	..	..
,, ,,	Sydney						Glasgow	London & Glasgow Co.	Bldg.	..								

CANADA.

P. 1st cl. Cr.	Niobe	11,000	435	69	26	16,500	Barrow	Vickers	1897	1899	..	..	..	16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 2 M.	2	20·5	1000	600
P. 2nd cl. Cr.	Rainbow . shd.	3600	300	43¾	17½	9000	Jarrow	Palmer	1891	1893	..	..	..	2 *6-in.*, 6 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 4 M., 1 1.	4	19·7	400	273
,, ,,	4 ships. Details not published. Tenders submitted May 1, 1911.																	

Royal Naval Reserved Merchant Cruisers.

—	Name.	Owners.	Length.	Breadth.	Draught of Water for the Admiralty List.	Gross Tonnage.	Indicated Horse-Power.	Ocean Speed.
Ships in receipt of an annual subvention and permitted to fly the blue ensign.	Mauretania	Cunard Co.	Feet. 785	Feet. 88	Feet. 33·6	Tons. 31,938	68,000	Knots. 26·6* *t*
	Lusitania	,,	785	88	33·6	31,550	68,000	26·6* *t*

* Speed of best day's run, 1910.

In addition to the above, the Cunard Company holds all vessels for the time being the property of the Company at the disposal of His Majesty's Government for hire or purchase.

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ARGENTINE REPUBLIC.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Garibaldi** . .	6732	328	59¾	24	13,384	Sestri Ponente	1895	1896	752,000	6–3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6 H.S.	2 *10-in.*, 10 *6-in.*, 6 *4·7-in.*, 10 *2·2-in.*, 10 *1·4-in.*, 2 M.*	..	19·9 *t*	1000	500
a.c.	**General Belgrano** .	7069	328	59¾	24	13,000	Leghorn .	1897	1899	696,700	6–3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6 H.S.	2 *10-in.*, 14 *6-in.*, 2 *3-in.*, 10 *2·2-in.*, 8 *1·4-in.*, 2 L., 2 M.*	4	20·1 *t*	1000	500
a.c.	**General San Martin**	6773	328	59¾	24	13,000	Leghorn .	1896	1898	688,200	6–3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6 H.S.	4 *8-in.*, 10 *6-in.*, 6 *4·7-in.*, 12 *2·2-in.*, 10 *1·4-in.*, 2 L., 2M.*	4	19·8	1100	500
c.d.s.b.	**Independencia** .	2336	230	44½	13	3000	Birkenhead .	1891	1893	176,000	8 *comp.*	2	..	8 *comp.*	8 *comp.*	..	2 *9·4-in.*, 4 *4·7-in.* (A), 4 *3-pr.* (A), 4 M.	..	14·4 *t*	340	225
c.d.s.b.	**Libertad** . . .	2336	230	44½	13	3000	Birkenhead .	1890	1892	176,000											
b.	**Moreno** . .	27600†	585	98	27½	39,500 B. & W. Curtis t.	Quincy, Mass.	Bldg.	..	2,200,000	12–10 K.S.	3–2	9–6 K.S.	9 K.S.	12–9 K.S.	6 K.S.	12 *12-in.*, 12 *6-in.*, 16 *4-in.*, 10 smaller.	2 sub.	22½	1600 4000	1046
	Rivadavia .						Camden, N.J. (N.Y.S. Co.)														
a c.	**Pueyrredon** . .	6773	328	59¾	24	13,000 B.	Sestri Ponente	1898	1901	782,000	6–3 H.S.	1½	6 H.S.	5 H.S.	6 H.S.	6 H.S.	2 *10-in.*, 10 *6-in.*, 6 *4·7-in.*, 10 *2·2-in.*, 10 *1·4-in.*, 2 M.*	4	20·1 *t*	1000	500

* Garibaldi, General San Martin, General Belgrano and Pueyrredon have Armstrong guns.

† Normal; 30,000 tons full load; oil fuel is 600 tons.

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ARGENTINE REPUBLIC.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr. . .	**Buenos Aires** shd.	4780	396	47½	19	17,000	Elswick .	1895	1895	383,000	..	4½	2 *8-in.* (A.), 4 *6-in.*, 6 *4·7-in.*, 16 *3-pr.*, 6 *1-pr.*	3	23·2* *t*	1000	429
to.g.b. .	**Espora** . .	520	210	25	8	3500 Y	Birkenhead .	1890	1891	..	..	..	2 *3-in.*, 4 *1·8-in.*, 2 M. . .	5	20·0	180	124
cr. . .	**Nueve de Julio**	3570	354	44	19½	14,350	Elswick .	1892	1892	293,000	4½	4½	4 *6-in.* (A.), 8 *4·7-in.*, 12 *3-pr.*, 12 *1-pr.*	5	22·74 *t*	770	300
to.g.b. .	**Paraná** . .	1000	240	32½	7½	..	Elswick .	1908	1909	..	1	3–2†	2 *6-in.* Howitzers, 6 *12-pr.*, 8 M., 4 *12-pr.* field.	..	15·0	120	150
to.g.b. .	**Patria** . .	1070	250	31	10	4500	Birkenhead .	1893	1894	87,000	..	..	2 *4·7-in.*, 4 *8-pr.*, 2 *3-pr.*, 2 M.	5	20·75 *t*	288	159
to.g.b. .	**Rosario** . .	1000	240	32½	7½	..	Elswick .	1908	1909	..	1	3–2†	2 *6-in.* Howitzers, 6 *12-pr.*, 8 M., 4 *12-pr.* field.	..	15·0	120	150
cr. . .	**25 de Mayo** .	3200	325	43	16	13,800	Elswick .	1890	1892	260,000	4½	4½	2 *8·2-in.* (A.), 8 *4·7-in.*, 12 *3-pr.*, 12 *1-pr.*	6	22·43 *t*	600	185

* Natural draught. † Side.

The training-ship (cruiser) Presidente Sarmiento, 2750 tons, 2000 I.H.P. (locomotive and Niclausse boilers), and 13 knots speed, with 19 guns and three torpedo tubes; launched by Messrs. Laird, 1897. There are several other small gunboats and old vessels.

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AUSTRIA-HUNGARY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	Arpád Babenberg	8208	354½	65¾	23¾	15,000 B.	Trieste	1901 1902	1903 1904	650,900 667,000	8½ K.S.	2½	4 K.S.	8 K.S.	8¼ K.S.	5 K.S.	3 *9·4-in.*, 12 *5·9-in.*, 10 *2·8-in.*, 8 M., 2 l.	2 (sub)	19·6 *t*	500 840	638
c.d.s.	Budapest	5462	305	55¾	21	9185 B.	Trieste	1896	1897	400,600	10½ H.S.	2½	3¼ H.S.	8 H.S.	10½ H.S.	3¼ H.S.	4 *9·4-in.*, 6 *5·9-in.*, 12 *1·8-in.*, 6 M., 2 l.	4	17·8 *t*	500	450
b.	Erz. Friedrich	10433	390½	72¼	24½	18,130 *t*	Trieste	1904	1906	912,500	8¼ K.S.	3	5 K.S.	8 H.S.	9¼ H.S.	7 H.S.	4 *9·4-in.*, 12 *7·5-in.*, 12 *2·8-in.*, 6 *1·8 in.*, 8 M., 2 l.	2 sub.	20·56 *t*	1315	..
b.	Erz. Karl							1903	1906										20·36 *t*		
	Erz. Ferdinand Max					18,000 Y.		1905	1907										20·0		
b.	Erz. Franz Ferdinand	14226	450¾	80½	26½	26,000 Y. *t*	Trieste	1908	1910	..	9–7½ K.S.	2	6 K.S.	6 K.S.	10 K.S.	8 K.S.	4 *12-in.*, 8 *9·4-in.*, 20 *3·9-in.*, 6 *12-pr.*, 2 M.	3 sub.	20·6 *t*	750 1200	816
b.	Habsburg	8208	354½	65¾	23¼	15,000 B.	Trieste	1900	1902	626,000	8½ H.S.	2½	4 H.S.	8 H.S.	8¼ H.S.	5 H.S.	3 *9·4-in.*, 12 *5·9-in.*, 10 *2·8-in.*, 8 M., 2 l.	2 (sub)	19·6 *t*	500 840	638
b.	Kaiser Franz Josef,* "No. IV."	20400	495	89	26	50,000 T., W.T.	Trieste	Bldg.	..	2,500,000	11 K.S.	2½	8 K.S.	..	11 K.S.	..	12 *12-in.*, 16 *3-in.*, 24 smaller	..	23·0	..	..
a.c	Kaiserin Maria Theresia	5187	351	52½	21¼	9755	Trieste	1893	1895 1910	304,187	4	2	..	4	4	4	2 *7·5-in.*, 8 *5·9-in.*, 2 *2·8-in.*, 14 *1·8-in.*, 5 M., 2 l.	4	19·0	740	502
a.c	Kaiser Karl VI.	6151	367½	56	20¼	12,800 B.	Trieste	1898	1900	429,000	10 H.S.	1½	6 H.S.	8 H.S.	8¾ H.S.	6 H.S.	2 *9·4-in.*, 8 *5·9-in.*, 16 *1·8-in.*, 4 M., 2 l.	4	20·7 *t*	800	535
c.d.s.	Monarch	5550	305	55¾	21	8900	Pola	1895	1898	399,062	10½ H.S.	2½	3½ H.S.	8 H.S.	10½ H.S.	3¼ H.S.	4 *9·4-in.*, 6 *5·9-in.*, 12 *1·8-in.*, 6 M., 2 l.	4	17·4 *t*	500	450
b.	Radetzky	14226	450¾	80½	26½	20,000 Y.	Trieste	1909	1910	..	9–7½ K.S.	2	6 K.S.	6 K.S.	10 K.S.	8 K.S.	4 *12-in.*, 8 *9·4-in.*, 20 *3·9-in.*, 6 *12-pr.*, 2 M.	3 sub.	20·5	750 1200	816
a. c.	St. Georg	7185	383¾	61¾	21¼	15,270 *t*, Y.	Pola	1903	1906	581,583	8½–6½ K.S.	1½	5 K.S.	7 K.S.	8½–5½ K.S.	6 K.S.	2 *9·4-in.*, 5 *7·5-in.*, 4 *5·9-in.*, 9 *2·8-in.*, 14 M., 2 l.	2 (sub)	22 *t*	1000	..
b.	Tegetthoff,* "No. V."	20400	495	89	26	50,000 T., W.T.	Trieste	Bldg.	..	2,500,000	11 K.S.	2½	8 K.S.	..	11 K.S.	..	12 *12-in.*, 16 *3-in.*, 24 smaller	..	23·0	..	..
c d.s.	Wien	5550	305	55¾	21	8480	Trieste	1895	1897	397,850	10½ H.S.	2½	3¼ H.S.	8 H.S.	10½ H.S.	3¼ H.S.	4 *9·4-in.*, 6 *5·9-in.*, 12 *1·8-in.*, 6 M., 2 l.	4	17·6 *t*	500	450
b.	Zrinyi	14226	450¾	80½	26½	20,000 Y.	Trieste	1910	..	..	9–7½ K.S.	2	6 K.S.	6 K.S.	10 K.S.	8 K.S.	4 *12-in.*, 8 *9·4-in.*, 20 *3·9-in.*, 6 *12-pr.*, 2 M.	3 sub.	20·5	750 1200	816

Six armoured river monitors, Bodrog, Kőrös, Leitha, Maros, Szamos, and Temes, of 300–437 tons displacement.

* Particulars uncertain; names unofficial and uncertain (April 10, 1911). The third ship of the class is to be built at Trieste, and the fourth at the Danubius Yard, Fiume.

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AUSTRIA-HUNGARY.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
to. cr.	**Admiral Spaun***	3500	416¾	42	15½	20,000 Y. tur.	Pola	1909	..	..	1	..	7 *3·9-in.*, 2 M.	2	26·0	..	..
to. cr.	**Aspern**	2362	301¾	39½	14¼	7300 Y	Pola	1899	1901	155,000	2	..	8 *4·7-in.*, 8 *1·8-in.*, 4 M.	1	20·0	470 500	289
to. g. b.	**Blitz**	354	193½	22¼	8	3500	Elbing	1888	1889	..	..	..	8 *1·8-in.*	4	21·0	250	59
cr. 2nd cl.	**Kaiserin Elizabeth**	4000	321½	47½	18½	8000	Pola	1890	1892	..	2¼	3½	2 *9·4-in.* (K.), 6 *5·9-in.* do., 13 *1·8-in.*, 4 M., 2 l.	5	19·0	660	418
cr. 2nd cl.	**Kaiser Franz Josef I.**	3966	321½	47½	18½	8000	Trieste	1889	1891	..	2¼	3½	2 *9·4-in.* (K.), 6 *5·9-in.* do., 16 *1·8-in.*, 2 l.	5	19·0	660	426
to. g. b.	**Komet**	354	193½	22¼	8	3500	Elbing	1888	1889	..	..	..	9 *1·8-in.*	4	21·0	50	59
to. g. b.	**Magnet**	502	220	26¾	8	5000 T	Elbing	1896	1899	51,052	..	..	6 *1·8-in.*	3	26·0 *t*	105	80
to. g. b.	**Meteor**	344	187	22¼	8	3500	Elbing	1887	1889	..	..	..	9 *1·8-in.*	4	23·1	120	59
Mining	**Pelikan**	2431	279	39½	15½	4600	Elbing	1891	1893	..	..	..	2 *5·9-in.* (K.), 8 smaller	4	18·0	..	198
to. g. b.	**Planet**	492	210	23	8¼	3500	Jarrow	1889	1890	..	..	..	2 *2·8-in.*, 8 *1·8-in.*	3	19·6	78	84
to. g. b.	**Satellit**	531	220	26¾	9¼	4000	Elbing	1893	1893	..	1½	..	1 *2·8-in.*, 8 *1·8-in.*	..	21·87	76	84
to. cr.	**Szigètvár**	2313	301¾	39½	14¼	7300 Y.	Pola	1899	1901	155,000	2	..	8 *4·7-in.*, 8 *1·8-in.*, 4 M.	1	20·0	470 500	289
to. g. b.	**Trabant**	522	220	23	8¼	3500	Trieste	1890	1891	..	..	..	2 *2·8-in.*, 8 *1·8-in.*	3	20·0	..	84
to. cr.	**Zenta**	2264	301¾	39½	12¼	7300 Y.	Trieste	1897	1899	143,780	2	..	8 *4·7-in.*, 8 *1·8-in.*, 4 M.	1	20·9 *t*	470 500	289

* 2½ in. side armour and 2 in. bulkhead. Three cruisers of the same (class G, H, and J) are to be begun this year.

Donau, training corvette, launched at Pola, 1893 (2307 tons). A submarine depôt and salvage vessel, 950 tons, 15 knots, is completing at Fiume.
Tender and repair ship for flotillas, Gaea (*ex* Fürst Bismarck).

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BRAZIL.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above Belt.	Bulkheads.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in	in.	in.	in.			knots.	tons.	
c.d.s., t.	**Marshal Deodoro**	3112	267½	48	13½	3400 D'A.	La Seyne	1898	1900	..	13¾–4 H.S.	1½	..	..	8 H.S.	3 H.S.	2 *9·4-in.*, 4 *4·7-in.*, 2 M., 4 *6-pr.*, 2 *1-pr.*	2 (sub.)	15·0	236	200
c.d.s., t.	**Marshal Floriano**							1899	1901												
b.	**Minas Geraes**	19,281	500	83	25	27,212 *t* B.&W.	Elswick	1908	1909	1,821,400	9–6–4 K.S.	2	9–6–4 K.S.	9	12–8 K.S.	9 K.S.	12 *12-in.*, 22 *4·7-in.*, 8 *3-pr.*	4	21·4 *t*	900 2400	900
b.	**Rio de Janeiro***	32,000	640	92	26	..	Elswick	Bldg.	..	2,900,000	..	..	..	..	..	...	12 *14-in.*, 14 *6-in.*, 14 *4-in.*, 12 l. and M.	(3 sub.)	22·5	..	..
b.	**São Paulo**	19,281	500	83	25	28,645 *t* B.&W.	Barrow	1909	1910	1,821,400	9–6–4 K.S.	2	9–6–4 K.S.	9	12–8 K.S.	9 K.S.	12 *12-in.*, 22 *4·7-in.*, 8 *3-pr.*	4	21·6 *t*	900 2400	900

* Particulars uncertain.

Also river monitors Maranhao and Pernambuco, built at Rio de Janeiro. Two armoured gunboats projected. Two monitors, 335 tons.

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BRAZIL.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr.	**Almirante Tamandare** shd.	4660	294	46	18¼	7500	Brazil	1890	1893	..	1½	3	10 *6-in.*, 2 *4·7-in.*, 8 M.	8	17·0	750	450
„	**Bahia***.	3100	380	39	13½	17,500 tur.	Elswick	1909	1910	328,500	¾–1½	..	10 *4·7-in.*, 8 *1·8-in.*	2	27·0 *t*	650	260
„	**Barroso** . . . shd.	3600	330	43¾	16¾	7500	Elswick	1896	1897	..	3	4½ shields	6 *6-in.*, 4 *4·7-in.*, 10 *6-pr.*, 4 *1-pr.*, 4 M.	3	20·0	700	300
„	**Benjamin Constant** . shd.	2707	236	46	18	2800	La Seyne	1892	1894	..	2	..	4 *6-in.*, 8 *4·7-in.*, 8 M., 4 l.	4	14·0	260	287
to.g.b.	**Gustavo Sampaio** . .	500	197	21	7¾	2500	Elswick	1893	1894	..	..	..	2 *20-pr.*, 4 *7-pr.* . .	3	18·0	150	95
cr.	**Republica** †. . . .	1300	210	35	13	750	Elswick.	1892	1894	..	2–1	..	6 *4·7-in.*, 4 *6-pr.*, 6 M. .	4	17·0	170	160
„	**Rio Grande do Sul** . .	3100	380	39	13½	17,500 tur.	Elswick	1909	1910	328,500	..	..	10 *4·7-in.*, 8 *1·8*-in.	2	27·4 *t*	650	260
to.cr.	**Tamoyo**	1063	269	28¾	9¾	6500	Kiel . .	1898	1900	..	..	4½ shields	2 *4·1-in.*, 6 *2·2-in.*, 2 *1·4-in.*, 2 M.	3	23·0	293	110
„	**Timbira**	1014	249½	30¾	10¼	7000	Kiel . .	1896	1897	..	½	4½ shields	2 *4·1-in.*, 6 *2·2-in.*, 2 *1·4-in.*, 2 M.	3	22·5	250	110
g.v.	**Tiradentes** . . . shd.	800	165	30	11	1200	Elswick	1892	1893	..	..	..	4 *4·7-in.*, 3 *6-pr.*, 4 M. .	2	14·5	110	107
to.cr.	**Tupy**	1014	249½	30¾	10¼	7000	Kiel . .	1896	1897	..	½	4½ shields	2 *4·1-in.*, 6 *2·2-in.*, 2 *1·4-in.*, 2 M.	3	22·5	250	110

Eleven screw gunboats, 200 tons to 400 tons, and four 12-knot river gunboats built at Poplar. Two river gunboats built by Messrs. Yarrow were sent out in sections, 1907.

* The Ceara, a sister ship of the Bahia, is being built.

† To be converted into a mine-layer. Another mine-layer is to be built.

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CHILI.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.		Guns.	Torpedo Tubes.			
															Heavy Guns.	Secondary.					
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			kts.	tons.	
a.c.	Almirante O'Higgins shd.	8500	411¾	62½	22	16,000 B.	Elswick .	1897	1898	..	7–5	2	..	..	7½–6	6	4 *8-in.*, 10 *6-in.*, 4 *4·7-in.*, 10 *12-pr.*, 10 *6-pr.*, 4 M.	3 (2 sub.)	21·5 *t*	1260	..
b.	Capitão Prat . . shd.	5981	328	60¾	21¾	12,000	La Seyne	1890	1893	391,000	12	3	4	..	10½	2	4 *9·4-in.* (Canet), 8 *4·7-in.* (Canet), 10 *12-pr.*, 14 smaller and M.	4	18·3 *t*	775	400 1100
a.c.	Esmeralda . . .	7020	436	53½	22½	16,000	Elswick .	1896	1897	..	6 H.S.	2	..	6 H.S.	4½ Shields	..	2 *8-in.*, 16 *6-in.*, 8 *12-pr.*, 2 *3-pr.*, 4 M.	3 (2 sub.)	22·8 *t*	1350	500

Capitão Prat reconstructed. Two battleships of 26,000 tons are proposed.

Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.						in.	in.			knots.	tons.	
to g.b.	Almirante Condell . }	750	240	27½	10½	{4500 B.}	Birkenhead .	1890	1892	..	..	..	3 *14-pr.*, 4 *3-pr.*, 2 M. .	5	21·0	210	..
,,	Almirante Lynch . }																
or.	Blanco Encalada . shd.	4400	370	46½	18½	14,500	Elswick . .	1893	1894	..	4–1¾	..	2 *8-in.*, 10 *6-in.*, 12 *3-pr.*, 10 *1-pr.**	5	22·78 *t*	900	427
,,	Chacabuco . . shd	4500	360	46	18†	15,750	Elswick . .	1901	1903	..	4½–1¾	..	2 *8-in.*, 10 *4·7-in.*, 16 *1·8-in.*, 2 M., 1 l.	5	23·0	1000	..
,,	General Baquedano (Training)	2330	240	45¾	18†	1500 B.	Elswick . .	1898	1900	..	..	..	4 *4·7-in.*, 2 *12-pr.*, 2 *6-pr.*, 2 M., 1 l.	1	13·7 *t.*	300	302
,,	Ministro Zenteno . shd.	3600	330½	43¾	16¾	6500	Elswick . .	1896	1898	..	..	..	8 *6-in.*, 10 *6-pr.*, 4 *1-pr.** .	3	20·0 *t*	800	..
,,	Presidente Errásuriz shd.	2047	268	35¾	19½	5400	La Seyne .	1890	1892	..	3½	..	4 *6-in.* (Canet), 2 *5-in.*, 4 *2·2-in.*, 6 M.	3	19·0	200	171

Two Gunboats of 145 tons displacement and one of 180 tons. Torpedo-cruiser Almirante Simpson (812 tons) sold to Ecuador.

* Armstrong.

† Mean draught.

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CHINA.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.						in.	in.			kts.	tons.	
cr.	**Foo-Ching**	2500	253	36½	18	2400	..	1893	1895	..	4–2	4½	3 *5-in.* (K.), 4 M., 2 l.	..	16·0	..	..
to.g.b.	**Fei-Ying**	837	257½	28½	12½	4500 Y.	Stettin	1895	1895	..	..	2	2 *4-in.*, 6 *3·4-in.*, 4 smaller	3	21·8 *t*	75	90
cr.	**Hai-Chi**	4300	396	46⅔	18½	17,000	Elswick	1898	1899	..	5	6	2 *8-in.*, 10 *4·7-in.*, 12 *3-pr.*, 4 *1·4-in.*, 6 M.	5	24·0	800	374
„	**Hai-Shen**	2903	314⅔	41	16	8000	Vulcan / Stettin	1898 / 1897 / 1897	1898 / 1898 / 1898	..	3	2	3 *6-in.* (K.), 8 *4-in.*, 6 *1·4-in.* Hotchkiss, 6 M.	3 (1 sub.)	20·7 *t*	220 / 500	244
„	**Hai-Shew**																
„	**Hai-Yung**																
„	**Hi-Ying**	2165	253	36½	18	2400	..	1895	1897	..	..	..	2 *8-in.* (A.), 8 *4·7-in.*, 4 M.	1	21·0	..	..
to.cr.	**Kien-Wei**	861	256	26½	10½	7000	Foochow	1900	1902	..	..	..	1 *8·9-in.*, 3 *2·5-in.*, 6 *1·4-in.*	2	22·5	360	300
„	**Kien-Gnan**					N.S.	Foochow	1899	1902	..	..	..					
to.g.b.	**Kwang-Ting**	1000	235	27½	11¼	3400	..	1890	1892	..	..	..	3 *4·7-in.*, 4 M., 2 l.	4	16·0	..	120
g.b.	**Tchu-Tai**	552	..	..	..	..	Kobe	1906	..	..	..	..	2 *4·7-in.*, 2 *12-pr.*	..	13·0	..	..
cr.	2 Unnamed	2460	330	39½	13	6000	Barrow / Elswick	Bldg.	..	..	¾	..	2 *6-in.*, 4 *4-in.*, 2 *3-in.*, 6 *3-pr.*, 2 *1-pr.*	2	20·0	225 / 600	270

Ten river gunboats (570 tons) and one smaller have been built in Japan. A river gunboat of 150 tons is being built at the Germania Yard, Kiel. At the Kawasaki Yard, Kobe, the Kiang Heng, Jsu Jang and another small cruiser, or gunboat, have lately been built.

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DENMARK.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c.d.s., *t.*	**Herluf Trolle** .	3415	271	50	16½	4200 T.	Copenhagen	1899	1901	..	8–4 H.S	2	7 H.S.	..	6 H.S.	6 H.S.	2 *9·4-in.*, 4 *5·9-in.*, 10 *2·2-in.*, 8 smaller.	3 (sub.)	16·0	250	250
b.	**Iver Hvitfeldt** .	3208	242	49½	18	5100	Copenhagen	1886	1889 1900	200,000	12	2	..	9½	8	..	2 *10·2-in.* (K.), 10 *6-pr.*, 8 M.	4 (1 sub.)	15·6	250	298
c.d.s., *t.*	**Olfert Fischer** .	3415	271	50	16½	4200	Copenhagen	1903	1905	..	8–4 K.S.	2	7 K.S.	..	6 K.S.	6	2 *9·4-in.*, 4 *5·9-in.*, 10 *2·2-in.*, 8 smaller.	3 (sub.)	16·0	250	250
c.d.s., *t.*	**Peder Skram** .	3543	274½	51½	16½	4600	Copenhagen	1908	1909	..	8–4 K.S.	2	..	..	7 K.S.	6 K.S.		4	16·5	250	250
c.d.s., *t.*	**Skjold** . .	2115	226½	38	13½	2200 T.	Copenhagen	1896	1899	..	9	2	..	7	8	4½	1 *9·4-in.*, 3 *4·7-in.* (K.), 4 *1·8-in.*, 1 M.	4	13·0	280	210

Three armoured gunboats of a new class are to be built.

DENMARK.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.				tons.	
3rd cl. *cr.*	**Geiser** . . .	1260	257½	27½	11½	3000 T.	Copenhagen .	1892	1893	..	1½	..	2 *4·7-in.*, 4 *3·4-in.*, 6 M. .	4	17·1 *t*	125	155
„	**Heimdal** . .	1260	257½	27½	11½	3000 T.	Copenhagen .	1894	1896	..	1½	..	2 *4·7-in.*, 4 *3-pr.*, 6 M. .	4	17·5	125	155
„	**Hekla** . . .	1260	233	32¾	11½	3000 T.	Copenhagen .	1890	1893	..	1½	..	2 *6-in.*, 4 *2·2-in.*, 6 M. .	4	17·0	125	155

Two obsolete cruisers, Fyen (2580 tons) and Valkyrien (2854 tons). **Gunboats.**—Six (*Falster*, *Lille Belt*, *Öresund*, *Store Belt*, *Grönsund*, *Guldborgsund*), of 150 to 240 tons, 200 to 400 I.H.P.

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FRANCE.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Second-ary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Aube** (Amiral)	9856	453	66½	24½	22,155 *t.* B.	St. Nazaire	1902	1904	973,440	6–4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *6·4-in.*, 6 *3·9-in.*, 20 small Q.F. and M.	2 (sub.)	21·9 *t*	970 1590	615
t.	**Bouvet**	12,007	401¼	70¼	27½	14,000 B.	Lorient	1896	1898	1,100,770	15¾–8 H.S.	3½	4 H.S.	..	14½ H.S.	4 H.S.	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 8 *3·9-in.*, 19 small Q.F. and M.	2 (sub.)	18·2 *t*	621	621
t.	**Bouvines**	6691	293¾	58¼	23¼	8400 A'D.	La Seyne	1892	1894	594,640	17¾	4	..	..	14½	..	2 *12-in.*, 8 *3·9-in.*, 4 *1·8-in.*, 10 *1·4*-in. M.	2	16·05 *t*	300	323
t.	**Brennus**	11,190	361	67	26¼	14,000 B.	Lorient	1891	1893	991,767	15¾ comp.	4	4¾ comp.	..	17¾ comp.	4¾ comp.	3 *13·4-in.*, 10 *6·4-in.*, 23 small Q.F. and M.	4	17·1 *t*	800	696
a.c.	**Bruix**	4735	365½	46	19¾	9049 B.	Rochefort	1894	1896	409,622	3¾–2¾	2	3¾	..	3¾	3¾	2 *7·6-in.*, 6 *5·5-in.*, 4 *2·5-in.*, 4 *1·8-in.*, 4 *1·4-in.*, M.	4	18·3 *t*	406	391
t.	**Carnot**	11,954	382½	70½	27¼	16,300 *t.* D'A.	Toulon	1894	1897	1,070,088	17¾–9 comp.	2¾	4	..	14½	4	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 4 *2·5-in.*, 16 *1·8-in.*, 10 *1·4-in.*, and M.	2 (sub.)	17·86 *t*	705	625
b.	**Charlemagne**	11,108	385½	66½	27½	14,500 B.	Brest	1895	1898	1,096,432	15¾ H.N.	3½	3 H.N.	..	15¾ H.N.	3 H.N.	4 *12-in.*, 10 *5·5-in.*, 8 *3·9-in.*, 16 *1·8-in.*, 10 *1·4-in.*, 8 M.	2 (sub.)	18·1 *t*	680 1100	631
t.	**Charles Martel**	11,693	392½	71	27½	14,996 *t.* D'A.	Brest	1893	1897	1,092,830	17¾	3½	4	..	15¾	4	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 4 *2·5-in.*, 14 *1·8-in.*, 5 *1·4-in.*	2 (sub.)	18·1 *t*	677	632
a.c.	**Charner** (Amiral)	4702	348	46	19¼	8300 B.	Rochefort	1893	1895	353,200	3¾–2¾	2	3¾	..	3¾	3¾	2 *7·6-in.*, 6 *5·5-in.*, 14 small Q.F. and M.	4	18·2 *t*	413	375
a.c	**Condé**	9856	453	63¾	24½	22,175 Nic.	Lorient	1902	1904	863,799	6–4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *6·4-in.*, 6 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	21·4 *t*	970 1580	615
b.	**Condorcet**	18,028	476	84	27	22,500 tur.	St. Nazaire	1909	..	2,165,200	10–8 K.S.	2¾	8¾ K.S.	..	12 K.S.	8¾ K.S.	4 *12-in.*, 12 *9·4-in.*, 16 *12 pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	19·0	960 2010	690
b.	**Courbet**	23,100	541½	88½	29½	29,000 tur.	Lorient	Bldg.	..	2,603,920	10½–7 K.S.	2¾–1¾	7 K.S.	..	..	7 K.S.	12 *12-in.*, 22 *5·5-in.*, 4 *3-pr.*	4 (sub.)	20·0	900 2700	998
b.	**Danton**	18,028	476	84	27	22,500 tur.	Brest	1909	..	2,068,000	10–8 K.S.	2¾	8¾ K.S.	..	12 K.S.	8¾ K.S.	4 *12-in.*, 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	19·0	960 2010	690
b.	**Démocratie**	14,635	438¾	79½	27½	19,190 B.	Brest	1904	1907	1,473,180	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 10 *7·6-in.*, 26 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	19·44 *t*	905 1285	793

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FRANCE.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Desaix** . shd.	7578	426½	58½	24½	17,715 *t* B.	St. Nazaire	1901	1903	762,759	4–3 H.S.	2¾	..	..	3½ H.S.	..	8 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 4 *1·4-in.*	2	21·7 *t*	880 1200	531
b.	**Diderot** . .	18,028	476	84	27	22,500 tur.	St. Nazaire	1909	..	2,167,000	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾	4 *12-in.*, 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	19·0	960 2010	690
a.c.	**DupetitThouars**	9367	452¾	63¾	24½	22,000 *t* B.	Toulon .	1901	1905	831,839	6 H.S.	2	3¾ H.S.	6 H.S.	6 H.S.	3¾ H.S.	2 *7·6-in.*, 8 *6·4-in.*, 4 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	22·5 *t*	1020 1600	610
a.c.	**Dupleix** . shd.	7578	426½	58½	24½	17,100 B.	Rochefort .	1900	1903	652,354	4–3 H.S.	2¾	..	..	3½ H.S.	..	8 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 4 *1·4-in.*	2	21·0	880 1200	531
a.c.	**Edgard Quinet**	13,780	515	70¼	27½	39,803 *t* B.	Brest .	1907	1910	1,307,536	6½–3½ K.S.	2½–1¼	5-2 K.S	4¾ K.S.	8 K.S.	4¾ K.S	14 *7·6-in.*, 20 *2·4-in.*, 2 smaller.	2 (sub.)	23·9 *t*	1242 2300	738
a.c.	**Ernest Renan** .	13,427	515	70½	26¾	37,500 Nic., *t*	St. Nazaire	1906	1909	1,410,000	6¾–4 H.S.	2	5-3 H.S.	4¾	6 H.S.	5 H.S.	4 *7·6-in.*, 12 *6·4-in.*, 16 *9-pr.*, 8 *3-pr.*	2 (sub.)	25·5 *t*	1354 2300	674
b.	**Gaulois** . .	11,105	385½	66½	27½	14,500 B.	Brest .	1896	1899	1,093,925	15¾ H.N.	3½–1½	3 H.N.	..	15¾ H.N.	3 H.N.	4 *12-in.*, 10 *5·5-in.*, 8 *3·9-in.*, 16 *1·8-in.*, 10 *1·4-in.*, 8 M.	2 (sub.)	18·0	680 1100	632
a.c.	**Gloire** . .	9856	453	63¾	24½	20,500 Nic.	Lorient .	1900	1904	883,269	6–4 H.S.	2	5-2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *6·4-in.*, 6 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	21·0	970 1590	615
a.c.	**Gueydon** . (Amiral)	9367	459	63¾	24½	20,200 Nic.	Lorient .	1899	1902	817,994	6–8¾ H.S.	2	3¾ H.S.	6 H.S.	6 H.S.	3¾ H.S.	2 *7·6-in.*, 8 *6·4-in.*, 4 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	21·0	1020 1600	610
t.	**Henri IV.** .	8807	354½	72	23	11,500 Nic.	Cherbourg.	1899	1902	801,248	11–7 H.S.	3	4¾ H.S.	..	11¾ H.S.	5 H.S.	2 *10·8-in.*, 7 *5·5-in.*, 12 *1·8-in.*, 2 M.	2 (sub.)	17·2 *t*	735 1100	464
t.	**Jauréguiberry** .	11,637	364	72¾	27¾	15,800 D'A.	La Seyne .	1893	1896	1,069,536	17¾	2¾	4	..	14½	4	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 4 *2·5-in.*, 12 *1·8-in.*, 8 *1·4-in.*, 8 M.	2 (sub.)	18·07 *t*	700	625
b.	**Jean Bart** .	23,100	541½	88½	29½	29,000 tur.	Brest .	Bldg.	..	2,528,888	10½–7 K.S.	2¾–1¾	7 K.S	..	..	7 K.S.	12 *12-in*, 22 *5·5-in*, 4 *3-pr.*	4 (sub.)	20·0	900 2700	998
a.c.	**Jeanne d'Arc** .	11,092	477¼	63¾	26½	28,000 Guyot	Toulon .	1899	1903	875,847	6–3 H.S.	2·2	3 H.S.	..	6 H.S.	5 H.S.	2 *7·6-in.*, 14 *5·5-in.*, 16 *1·8-in.*, 8 *1·4-in.*, 2 M.	2 (sub.)	21·7 *t*	1400 2000	626

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a.c.	**Jules Ferry** .	12,351	480½	70¼	27	28,753 Guyot	Cherbourg	1903	1906	1,169,940	6¾–4 H.S.	2	5–3 H.S.	6	6 H.S.	5 H.S.	4 *7·6-in.*, 16 *6·4-in.*, 22 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	22·8 *t*	1320 2100	728
a.c.	**Jules Michelet.**	12,370	480½	70½	27	27,700 Guyot	Lorient .	1905	1908	1,204,107	6–4 K.S.	2	5–3 K.S.	6 H.S.	8 K.S.	5 K.S.	4 *7·6-in.*, 12 *6·4-in.*, 24 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	23·2 *t*	1320 2100	724
b.	**Justice** . .	14,635	438¾	79½	27½	18,548 Nic. *t.*	La Seyne .	1904	1907	1,670,385	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 10 *7·6-in.*, 26 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	19·43 *t*	905 1825	793
a.c.	**Kléber** . shd.	7578	426½	58¼	24½	18,000 Nic.	Bordeaux .	1902	1904	770,320	4–3 H.S.	2¾	..	..	3½ H.S.	..	8 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 4 *1·4-in.*	2	21·2 *t*	880 1200	531
a.c.	**Latouche-Tréville**	4681	348	46	19½	8300 B.	Havre .	1892	1893	360,000	3¾–2¾	2	3¾	..	3¾	3¾	2 *7·6-in.*, 6 *5·5-in.*, 4 *2·5-in.*, 4 *1·8-in.*, 6 *1·4-in.*, M.	4	18·2 *t*	406	375
a.c.	**Léon Gambetta**	12,351	480½	70¼	27	27,500 Nic.	Brest .	1901	1904	1,169,940	6¾–4 H.S.	2	5–3 H.S.	6	8 H.S.	5 H.S.	4 *7·6-in.*, 16 *6·4-in.*, 22 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	23·06 K.	1320 2100	728
b.	**Liberté** . .	14,635	434¾	79½	27½	20,565 B. *t.*	St. Nazaire	1905	1907	1,652,436	11 H.S.	..	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 10 *7·6-in.*, 26 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	19·31 *t*	905 1825	793
a.c.	**Marseillaise** .	9856	453	63¾	24½	20,500 B.	Brest .	1900	1903	881,270	6–4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *6·4-in.*, 6 *3·9-in.*, 2 *2·5-in.*, 18 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	21·0	970 1590	615
t.	**Masséna** . .	11,735	384¾	66	27	13,500 D'A.	St. Nazaire	1895	1898	1,100,400	17¾–9¾	3½	4 H.S.	16	15½ H. S.	15¾ 4	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 8 *3·9-in.*, 12 *1·8-in.*, 12 *1·4-in.*	2 (sub.)	17·1 *t*	630	642
b.	**Mirabeau** .	18,028	476	84	27	22,500 tur.	Lorient .	1909	..	2,032,000	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾ K.S.	4 *12-in.*, 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	19·0	960 2010	690
a.c.	**Montcalm.** .	9367	452¾	63¾	24½	19,600 N.S.	La Seyne .	1900	1902	902,809	6 H.S.	2	3¾ H.S.	6 H.S.	6 H.S.	2¾ H.S.	2 *7·6-in.*, 8 *6·4-in.*, 4 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	21·0	1020 1600	612
b.	**Patrie.** . .	14,635	438¾	79½	27½	17,859 *t.*Nic.	La Seyne .	1903	1906	1,674,870	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 18 *6·4-in.*, 26 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	19·12 *t*	905 1825	793
a.c.	**Pothuau** . .	5374	370½	50¼	21	10,398 B.	Havre .	1895	1891	384,000	3½–2	3⅜	2½	..	9½	5½	2 *7·6-in.*, 10 *5·5-in.*, 16 *1·8-in.*, 8 *1·4-in.*	4	19·2 *t*	538	461
b.	**République** .	14,635	438¾	79½	27½	19,626 *t.*Nic.	Brest .	1902	1906	1,523,136	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 18 *6·4-in.*, 26 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	19·15	905 1825	793

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FRANCE.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			kts.	tons.	
b.	**Saint Louis**	11,090	385½	66½	27½	14,500 B.	Lorient	1896	1900	1,080,997	15¾ H.N.	3½	3 H.N.	..	3–15¾ H.N.	3 H.N.	4 *12-in.*, 10 *5·5-in.*, 8 *3·9-in.*, 16 *1·8-in.*, 10 *1·4-in.*, 8 M.	2 (sub.)	18·0	820 1150	631
t.	**Suffren**	12,527	411¾	70½	27½	16,500 Nic.	Brest	1899	1903	1,195,564	12–8 H.S.	2¾	5–3 H.S.	..	12 H.S.	6–5 H.S.	4 *12-in.*, 10 *6·4-in.*, 8 *3·9-in.*, 20 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	18·0	1100 1820	615
t.	**Tréhouart**	6671	293½	58½	23½	8500 B.	Lorient	1893	1896	593,100	17¾	4	..	..	14½	..	2 *12-in.*, 8 *3·9-in.*, 4 *1·8-in.*, 4 *1·4-in.*, 8 M.	2	15·76 *t*	300	337
b.	**Vergniaud**	18,028	476	84	27	22,500 tur.	Bordeaux	1910	..	2,165,200	10–8 K.S	2¾	8¾	..	12 K.S.	8¾ K.S.	4 *12-in.*, 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	19·0	960 2010	690
b.	**Vérité**	14,635	438¾	79½	27½	20,433 *t.* B.	Bordeaux	1907	1908	1,661,409	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 10 *7·6-in.*, 26 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	19·26 *t*	905 1825	822
a.c.	**Victor Hugo**	12,351	480½	70¼	27	28,486 *t.* B.	Lorient	1904	1907	1,229,932	6¾–4 H S.	2	5–3 H.S.	6	8 H.S.	5 H.S.	4 *7·6-in.*, 16 *6·4-in.*, 22 *1·8-in.*, 2 *1·4-in.*	2 (sub.)	22·5 *t*	1320 2100	728
b.	**Voltaire**	18,028	476	84	27	22,500 tur.	La Seyne	1909	..	2,169,200	10–8 K.S.	2¾	8¾	..	12 K.S.	8¾ K.S.	4 *12-in.*, 12 *9·4-in.*, 16 *12-pr.*, 8 *3-pr.*, 2 *1-pr.*	2 (sub.)	19·0	960 2010	690
a.c.	**Waldeck-Rousseau**	13,780	515	70¼	27½	35,329 Nic. *t.*	Lorient	1908	..	1,301,380	6½–3½	2½	5	4¾	6	5½	14 *7·6-in.*, 20 *2·4-in.*, 2 *1-pr.*	2 (sub.)	23·6 *t*	1242 2300	738
b.	**No. 3** *	23,100	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12 *12-in.*	..	20·0	..	..
b.	**No. 4** *																				

Requin now used for the gunnery school. The Caïman, Dupuy de Lôme, Hoche, Indomptable, Jemmapes, and Valmy have been removed from the table of French armoured ships, having been placed on the list for condemnation by the Minister. * Characteristics doubtful.

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FRANCE.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
3rd cl. *cr.*	**Alger** . . .	4313	346	45¼	19½	8254 B.	Cherbourg .	1889	1891	280,000	3½	..	4 *6·4-in.*, 6 *5·5-in.*, 10 smaller, 10 M.	5	19·61 *t*	860	325
to. g. b. .	**Casabianca** . .	974	262½	26¾	11½	5200 D'A.	Bordeaux .	1895	1896	98,985	½	..	1 *3·9-in.*, 3 *2·5-in.*, 5 *1·8-in.*, 4 *1·4-in.*	2	22·0	116	143
3rd cl. *cr.*	**Cassard** . . .	3890	325½	45	20½	10,143 D'A.	Cherbourg .	1896	1898	318,712	3	2 shield	6 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 3 *1·4-in.*, 2 M.	2	19·8 *t*	630	385
to. g. b. .	**Cassini** . . .	966	262½	27¼	11½	5500 D'A.	Bordeaux .	1894	1894	98,500	½	..	1 *3·9-in.*, 3 *2·5-in.*, 4 *1·4-in.*	2	21·2 *t*	110	118
2ndcl. *cr.*	**Châteaurenault** shd.	7898	442¾	55¾	24½	24,300 *t.* N.S.	La Seyne .	1898	1902	606,656	2½	2 shield	2 *6·4-in.*, 6 *5·5-in.*, 10 *1·8-in.*	2	24·19 *t*	1400 / 2100	625
3rd cl. *cr.*	**Cosmao** . . .	1923	312	30½	14	6000	Bordeaux .	1888	1891	133,000	1½	..	4 *5·5-in.*, 8 other Q.F., 4 M.	4	20·5 *t*	200	190
g. v. .	**Décidée** . . .	635	184¾	26¼	12¼	1000 Nic.	Lorient .	1899	1900	54,100	..	..	2 *3·9-in.*, 4 *2·5-in.*, 4 *1·4-in.*	..	13·0	99	99
2nd cl. *cr.*	**D'Entrecasteaux** shd.	7995	383½	58½	25¾	13,500	La Seyne .	1896	1898	667,740	4	10–3 H.S.	2 *9·4-in.*, 12 *5·5-in.*, 12 *1·8-in.*	2	19·2 *t*	650	521
3rd cl. *cr.*	**Descartes** . shd.	3970	326	42¼	21¾	9000 B.	St. Nazaire .	1894	1896	334,725	1½	..	4 *6·4-in.*, 10 *3·9-in.*, 8 *1·8-in.*, 4 *1·4-in.*	2	21·0 *t*	552	386
3rd cl. *cr.*	**D'Estrées** . shd.	2421	311¾	39¼	17¾	8500 Nor.	Rochefort .	1897	1900	208,200	1½	..	2 *5·5-in.*, 4 *3·9-in.*, 8 *1·8-in.*, 2 *1·4-in.*	..	20·5 *t*	345 / 480	234

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FRANCE.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		s	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
to. g. b.	D'Iberville . .	952	262½	27	11¼	5060 D'A.	St. Nazaire .	1893	1894	99,120	½	..	1 *3·9-in.*, 1 *2·5-in.*, 4 *1·4-in.*	6	21·4 *t*	117	118
3rd cl. *cr.*	Du Chayla . shd.	3890	325⅓	45	20½	10,009 D'A.	Cherbourg .	1895	1897	315,835	3	2 shield	6 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 3 *1·4-in.*, 2 M.	2	20·2 *t*	624	385
to. g. b.	Dunois . . .	889	256	27¾	12¾	7000 N.S.	Cherbourg .	1897	1898	123,383	..	..	6 *2·5-in.*, 6 *1·8-in.* . .	..	23·0	137	128
to. cr.	Epervier . .	1268	216½	29¼	15½	3200	Rochefort .	1885	1887	80,000	1½	..	5 *3·9-in.*, 1 *2·5-in.*, 6 M. .	4	17·6 *t*	160	134
to. cr.	Faucon . . .	1311	216½	29¼	15½	3200	Toulon . .	1887	1888	80,000	1½	..	5 *3·9-in.*, 1 *2·5-in.*, 6 M. .	4	18·0	150	134
3rd cl. *cr.*	Forbin . . .	1935	312	30½	16	5700	Rochefort .	1888	1890	123,739	1½	..	4 *5·5-in.*, 8 other Q.F., 4 M.	4	20·6	200	190
T.D.S.	Foudre . . .	5984	370½	52½	23½	11,900 *t.* D'A.	Bordeaux .	1895	1897	407,712	3½	..	8 *3·9-in.*, 4 *2·5-in.*, 4 *1·4-in.*	4	19·9 *t*	840	410
3rd cl. *cr.*	Friant . . .	3882	308½	43½	20¾	9000 Nic.	Brest . .	1893	1895	308,750	3	..	6 *6·4-in.*, 4 *3·9-in.*, 8 *1·8-in.*, 6 *1·4-in.*	2	18·19	587	358
2nd cl. *cr.*	Guichen . . shd.	8151	436¼	54¾	24½	24,000 D'A.	St. Nazaire .	1897	1899	611,945	2½	2 shield	2 *6·4-in.*, 6 *5·5-in.*, 10 *1·8-in.*	2	23·0	1460	625
3rd cl. *cr.*	Isly	4406	346	48¾	19½	8100	Brest . .	1891	1893	252,760	3	..	4 *6·4-in.*, 6 *5·5-in.*, 14 *2·5-in.* and *1·8-in.*, 8 M.	3	18·3	880	332
2nd cl. *cr.*	Jurien de la Gravière shd.	5595	440	43½	22	17,000 Guyot	Lorient . .	1899	1901	475,979	3	..	8 *6·4-in.*, 12 *1·8-in.* . .	2	22·9 *t*	600/900	511

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g. v.	**Kersaint**	shd.	1223	226	34½	15	2200	Rochefort	1897	1898	107,933	..	..	1 5·5-*in.*, 5 3·9-*in.*, 7 1·4-*in.*	..	15·0	199	110
to. g. b.	**La Hire**		889	256	27¾	12¾	7000 N.S.	Cherbourg	1898	1899	123,383	..	..	6 2·5-*in.*, 6 1·8-*in.*	..	23·0	137	128
3rd cl. *cr.*	**Lavoisier**		2285	330½	34½	17¾	6400 B.	Rochefort	1897	1899	202,024	1½	2 shield	4 5·5-*in.*, 2 3·9-*in.*, 8 1·8-*in.*, 2 1·4-*in.*, 4 M.	2	20·0	226	248
3rd cl. *cr.*	**Surcouf**		2012	312	30½	14	6000	Cherbourg	1888	1890	131,200	1½	..	4 5·5-*in.*, 8 other Q.F., 4 M.	4	20·5 *t*	200	190
g. v.	**Surprise**		617	184¾	24½	12½	853 *t.*	Havre	1895	1896	50,954	..	..	2 3·9-*in.*, 4 2·5-*in.*, 4 1·4-*in.*	..	13·4 *t*	73	99
g. v.	**Zélée**		554	185½	26	10½	1000 Nic.	Rochefort	1899	1900	..	..	..	2 3·9-*in.*, 4 2·5-*in.*, 4 1·4-*in.*	..	13·0	80	75

Gun vessel Fulton (899 tons); gunboats Comète, Lion. Shallow-draught gunboats Argus and Vigilante, launched at Chiswick 1900:—displacement, 122 tons; 13 knots.

Mine-layer Pluton, 560 tons, 6000 I.H.P., 20 knots, in course of construction.

Merchant Auxiliary Cruisers.—The Touraine, 8429 register tons, 19·5 knots, Lorraine, 11,869 register tons, 21 knots, Savoie, 11,200 register tons, 22½ knots, and Provence, 13,750 register tons, 22 knots, of the Compagnie Générale Transatlantique, are, under contract, auxiliary cruisers of the Navy in case of war, as well as some other vessels, and the Amazone, Magellan, Tonkin, Tourane, and other 17 and 17½ knot boats of the Messageries Maritimes.

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GERMANY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	**Aegir (Ersatz)***	27,000	..	..	..	..	Danzig (Schichau)	Bldg.	..	..	..	..	..	..	..	..	12 *12-in.*, 12 *6·7-in.*	..	..	..	..
a. c.	**Blücher**	15,550	499	80½	..	40,000 *t.*	Kiel	1908	1910	1,250,000	6 K.S.	..	..	..	..	..	12 *8·2-in.*, 8 *5·9-in.*, 16 *3·4-in.*	..	25·3 *t*	900 2360	847
b.	**Brandenburg**	9874	354½	65	24½	9640	Stettin (Vulcan)	1891	1893	606,500‡	15¾ *comp.*	2½	..	..	11¾ *comp.*	1½	6 *11-in.*, 8 *4·1-in.*, 8 *3·4-in.*, 12 *1·4-in.*, 8 M., 2 L.	3 (2 sub.)	16·5 *t*	680 800	552
b.	**Braunschweig**	12,997	398½	73½	24½	16,000 T.S. & C.	Germania	1902	1904	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *11-in.*, 14 *6·7-in.*, 18 *3·4-in.*, 4 M.	6 (sub.)	18·0	700 1600◊	660
b.	**Deutschland**	13,040	398½	72¾	24½	16,939 T.S. & C.	Germania	1904	1906	1,214,000	9½–4 K.S.	3	8 K.S.	6 K.S.	10–6 K.S.	6¾ K.S.	4 *11-in.*, 14 *6·7-in.*, 22 *3·4-in.*, 4 *1·4-in.*, 4 M.	6 (sub.)	18·5 *t*	700 1800†	736
b.	**Elsass**	12,997	398½	72¾	24½	16,812 W.T.& C.	Danzig (Schichau)	1903	1905	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *11-in.*, 14 *6·7-in.*, 18 *3·4-in.*, 4 M.	6 (sub.)	18·7	800 1600†	660
a. c.	**Friedrich Karl**	8858	393½	65½	24	18,500 Dürr.	Hamburg (Blohm&Voss)	1902	1904	875,000	4 K.S.	2	6 K.S.	4 K.S.	6 K.S.	4 K.S.	4 *8·2-in.*, 10 *5·9-in.*, 12 *3·4-in.*, 14 *1·4-in.*, 4 M.	4 (3sub.)	20·5 *t*	950 1500†	504
a. c.	**Fürst Bismarck**	10,570	393½	66½	26	14,000 Dürr.	Kiel	1897	1900	..	7¾ K.S.	3	..	..	7¾ K.S.	..	4 *9·4-in.*, 12 *5·9-in.*, 10 *3·4-in.*, 10 *1·4-in.*, 8 M.	6 (5 sub.)	19·0	1000†	565
a. c.	**Gneisenau**	11,420	449½	70¾	24½	26,000 T.S.	Bremen (Weser)	1906	1908	..	6–3 K.S.	2	6–4¾	..	6¾	..	8 *8·2-in.*, 6 *5·9-in.*, 20 *3·4-in.*, 14 *smaller.*	4	23·8 *t*	800† 2000	650
c. b.	**Goeben***	21,500	600	88	26¾	70,000 tur.	Hamburg (Blohm&Voss)	1911	..	..	7 K.S.	..	..	..	..	..	8 *12-in.*, 10 *5·9-in.* 14 *smaller.*	4	27·0	..	..
b.	**Hagen (Ersatz)***	27,000	..	..	..	..	Kiel (Howaldt)	Bldg.	..	..	..	..	..	..	..	..	12 *12-in.*, 12 *6·7-in.*	..	..	..	..
b.	**Hannover**	13,040	398½	73½	25½	22,492 T.S. *t.*	Wilhelmshaven	1905	1907	1,157,500	9½–4 K.S.	3	8 K.S.	6 K.S.	10–6 K.S.	6¾ K.S.	4 *11-in.*, 14 *6·7-in.*, 20 *3·4-in.*, 4 *1·4-in.*, 4 M.	6 (sub.)	19·16 *t*	700 1800†	736
b.	**Heimdall (Ersatz)***	22,000	..	..	..	28,000 (tur.)	Hamburg (Vulcan)	Bldg.	..	..	..	..	..	..	..	..	12 *12-in.*, 12 *6·7-in.*	..	..	..	..
b.	**Helgoland***	22,000	490	90	27½	22,000	Kiel (Howaldt)	1909	..	..	12–4	..	..	..	..	..	12 *12-in.*, 12 *5·9-in.*, 20 *4·1-in.*	6	20·0	950	950
b.	**Hessen**	12,997	398½	73¾	24½	16,000 T.S. & C.	Kiel (Germania)	1903	1905	1,157,500	9–4 K.S.	3	6 K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *11-in.*, 14 *6·7-in.*, 18 *3·4-in.*, 4 M.	6 (sub.)	18·0	800 1600†	660
c. b.	**"J"***	21,500	600	88	26¾	68,000	Hamburg (Blohm & Voss)	Bldg.	..	..	7 K.S.	..	..	..	..	..	8 *12-in.*, 10 *5·9-in.*, 14 *smaller*	4	..	..	..

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b.	.	**Kaiser***	.	.	.	22,000	..	..	..	28,000 (tur.)	Kiel.	.	1911	..	..	..	..	..	..	..	..	..	12 *12-in.*, 12 *6·7-in.*	.	..	..	..	..
b.	.	**Kaiser Barbarossa**								13,000 C.&T.	Danzig	.	1900	1901 1907	962,500	11¾ H. N. S.	3	..	..	9¾ H. N. S.	6 H.N.S.	4 *9·4-in.*, 14 *5·9-in.*, 12 *3·4-in.*, 12 *1·4-in.*, 8 M.	4 (sub.)	16·0	650 1050†	700
b.	.	**Kaiser Friedrich III.**	.	.	.					13,000 C.&T.	Wilhelms-haven		1896	1899													
b.	.	**Kaiser Wilhelm II.**	.	.	.	10,974	377¼	66¾	25½	13,000 C. & T.S.	Wilhelms-haven		1897	1900	962,500	11¾ H. N. S.	3	..	..	9¾ H. N. S.	6 H.N.S.	4 *9·4-in.*, 18 *5·9-in.*, 12 *3·4-in.*, 12 *1·4-in.*, 8 M.	6 (5sub.)	18·0	650 1050†	700
b.	.	**Kaiser Wilhelm der Grosse**	.	.						13,000 C. & T.S.	Germania.		1899	1901													
b.	.	**Kaiser Karl der Grosse**	.							13,000 C. & T.S.	Hamburg (Blohm & Voss)	.	1899	1901													
b.	.	**Lothringen**	.	.		12,997	398½	73¾	24½	16,950 W.T.&C.	Schichau (Danzig)		1904	1906	1,157,500	9–4 K. s.	3	6 K. s.	6 K.s.	10–6 K. s.	6 K. s.	4 *11-in.*, 14 *6·7-in.*, 18 *3·4-in.*, 4 M.	6 (sub.)	18·54 *t*	800 1600†	600
b.	.	**Mecklenburg**	.	.		11,643	393¾	68¼	24¾	14,000 C.T. & S.	Stettin (Vulcan)		1901	1903	1,061,250	9–4 K.s.	3	5½ K.s.	6 K.s.	10 K.s.	6 K.s.	4 *9·4-in.*, 18 *5·9-in.*, 12 *3·4-in.*, 12 *1·4-in.*, 8 M.	6 (sub.)	18·1 *t*	700 1450†	715
c. b.	.	**Moltke***	.	.	.	21,500	600	88	26¾	45,000 (tur.)	Hamburg (Blohm & Voss)	.	1910	..	..	7 K.s.	..	..	..	..	..	8 *12-in.*, 10 *5·9-in.*, 14 *smaller*	4	25	..	..
b.		**Nassau**	.	.	.	18,200	452	89	26½	20,000	Wilhelms-haven		1908	1909	1,825,000	10–4 K.s.	..	..	..	12 K.s.	..	12 *11-in.*, 12 *5·9-in.*, 16 *3·4-in.*	6	20·7 *t*	950 2700	961
b.	.	**Odin (Ersatz)***	.	.	.	27,000	..	..	..	..	Kiel (Germania)	.	Bldg.	..	..	..	..	..	..	..	..	12 *12-in.*, 12 *6·7-in.*	.	..	..	..	..
b.	.	**Oldenburg***	.	.	.	27,000	..	..	..	28,000	Danzig (Schichau)	.	1910	..	..	..	..	..	..	..	..	12 *12-in.*, 12 *6·7-in.*	.	..	..	..	..
b.	.	**Ostfriesland***	.	.	.	22,000	490	90	27½	22,000	Wilhelms-haven		1909	..	..	12–4	..	..	..	..	..	12 *12-in.*, 12 *5·9-in.*, 20 *4·1-in.*	6	20·0	950	950
b.	.	**Pommern**	.	.	.	13,040	398½	72¾	25¼	20,400 T.S. *t.*	Stettin (Vulcan)		1905	1907	1,214,000	9½–4 K.s.	3	8 K.s.	6 K.s.	10–6 K.s.	6¾ K.s.	4 *11-in.*, 14 *6·7-in.*, 20 *3·4-in.*, 4 *1·4-in.*, 4 M.	6 (sub.)	19·21 *t*	700 1800†	736
b.	.	**Posen**	.	.	.	18,200	452	89	26½	20,000	Kiel (Germania)		1908	1910	1,825,000	10–4 K.s.	..	..	..	12 K.s.	..	12 *11-in.*, 12 *5·9 in.*, 16 *3·4-in.*	6	20·5	950 2700	961
b.	.	**Preussen**	.	.	.	12,997	389½	73¾	24½	18,374 W.T.& C.	Stettin	.	1903	1905	1,157,500	9–4 K.s.	3	6 K.s.	6 K.s.	10–6 K.s.	6 K.s.	4 *11-in.*, 14 *16·7-in.*, 12 *3·4-in.*, 12 *1·4-in.* & 8 M.	6 (5sub.)	18·6 *t*	800 1600†	660
a. c.	.	**Prinz Adalbert**				8858	393½	65½	24	18,500 Dürr.	Kiel.	.	1901	1903	885,000	4 K.s.	1½	3 K.s.	3 K.s.	6 K.s.	4 K.s.	4 *8·2-in.*, 10 *5·9-in.*, 12 *3·4-in.*, 14 *1·4-in.*, 4 M.	4 (3sub.)	20·3	950 1500†	504
a. c.	.	**Prinz Heinrich**				8759	396	64½	25½	15,000 Dürr.	Kiel	.	1900	1902	730,000	4 K.s.	2½	4 K.s.	..	6 K.s.	4 K.s.	2 *9·4-in.*, 10 *5·9-in.*, 10 *3·4-in.*, 10 *1·4-in.*, 4 M.	4 (3sub.)	20·0	950	528
b.	.	**Rheinland**	.	.	.	18,200	452	89	26½	20,000	Stettin (Vulcan)	.	1908	1910	1,825,000	10–4 K.s.	..	..	..	12 K.s.	..	12 *11-in.*, 12 *5·9-in.*, 16 *3·4-in.*	6	20·0	950 2700	961
a. c.	.	**Roon**	.	.	.	9350	403¼	65½	24	20,625 Dürr.	Kiel.	.	1903	1905	875,000	4–3 K.s.	2¾	6 K.s.	4 K.s.	6 K.s.	4 K.s.	4 *8·2-in.*, 10 *5·9-in.*, 16 *3·4-in.*, 10 *1·4-in.*, 4 M.	4 (sub.)	21·17	750 1800†	50

* Particulars doubtful. † Also liquid fuel. ‡ Exclusive of armament. § And 200 tons "tar oil."

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GERMANY.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			kts.	tons.	
a. c.	Scharnhorst	11,420	449½	70¾	24½	26,000 T.S.	Hamburg (Blohm&Voss)	1906	1908	..	6–3 K.S.	2	6–4¾	..	6¾	..	8 *8·2-in.*, 6 *5·9-in.*, 20 *3·4-in.*, 14 smaller	4	22·5	800§ 2000	650
b.	Schlesien	13,040	398½	72¾	25½	16,939 T.S. & C.	Schichau / Germania	1906	1908	1,214,000	9½–4 K.S.	3	8 K.S.	6 K.S.	11–6 K.S.	6¾ K.S.	4 *11-in.*, 14 *6·7-in.*, 20 *3·4-in.*, 4 *1·4*, 4 M.	6 (sub.)	19·2 / 19·5 / *t*	700 / 1800§	736
b.	Schleswig-Holstein																				
b	Schwaben	11,643	393¾	68¼	24¾	14,000 C.&T.S.	Wilhelmshaven	1901	1903	1,061,250	9–4 K.S.	3	5½ K.S.	6 K.S.	10–6 K.S.	6 K.S.	4 *9·4-in.*, 18 *5·9-in.*, 12 *3·4-in.*, 12 *1·4-in.*, 8 M.	6 (5sub.)	18·0	700 1450§	715
b.	Thüringen *	22,000	490	90	27½	22,000	Bremen (Weser)	1909	..	..	12–4	..	..	..	..	..	12 *12-in.*, 12 *5·9-in.*, 20 *4·1-in.*	6	20	950	950
c. b.	Von der Tann	18,700	561	87	26½	71,500 *t.* (tur.)	Hamburg (Blohm&Voss)	1909	1911	1,833,000	6 K.S.	..	..	..	..	..	8 *11-in.*, 10 *5·9-in.*, 16 *3·4-in.*	4	27·6 *t*	1000 2800	883
b.	Westfalen	18,200	452	89	26½	26,792 (*t.*)	Bremen (Weser)	1908	1909	1,825,000	10–4	..	..	...	12	..	12 *11-in.*, 12 *5·9-in.*, 16 *3·4-in.*	6	20·2 *t*	950 2700	961
b.	Wettin	11,643	393¾	68¼	24¾	14,000 C.&T.S.	Schichau / Wilhelmshaven	1901 / 1900	1902 / 1902	1,071,250 / 1,071,250	9–4 K.S.	3	5½ K.S.	6 K.S.	10 K.S.	6 K.S.	4 *9·4-in.*, 18 *5·9-in.*, 12 *3·4-in.*, 12 *1·4-in.*, 8 M.	6 (sub.)	18·0	700 1450§	715
b.	Wittelsbach																				
b.	Wörth	9874	354¼	65	24½	10,224 (*t.*)	Kiel	1892	1894	595,250‡	15¾	2½	..	..	11¾	1½	6 *11-in.*, 8 *4·1-in.*, 8 *3·4-in.*, 12 *1·4-in.*, 8 M., 2 l.	3 (2sub.)	17·2	680 800	552
a. c.	Yorck	9350	403¼	65½	24	19,183 Dürr.	Hamburg (Blohm&Voss)	1904	1905	875,000	4–3 K.S.	2	6 K.S.	4 K.S.	6 K.S.	4 K.S.	4 *8·2-in.*, *10 5·9-in.*, 16 *3·4-in.*, 10 *1·4-in.*, 4 M.	4 (sub.)	21·1 *t*	750 1600§	550
b.	Zähringen	11,643	393¾	68¼	24¾	15,000 C.&T.S.	Kiel (Germania)	1901	1902	1,071,250	9–4 K.S.	3	5½ K.S.	6 K.S.	10 K.S.	6 K.S.	4 *9·4-in.*, 18 *5·9-in.*, 12 *3·4-in.*, 12 *1·4-in.*, 8 M.	6 (sub.)	19·0	650 1000§	715

* Particulars doubtful. ‡ Exclusive of armament. § Also liquid fuel.

The programme for 1911 includes two battleships to replace the Weissenburg and Kurfürst Friedrich Wilhelm (both sold to Turkey), and a third, additional, battleship, known as S, as well as the battle-cruiser K.

The old coast defence armour-clads Aegir, Odin, Hagen, Heimdall, Hildebrand, Frithjof, Beowulf, and Siegfried have been removed from the list.

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GERMANY.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
3rd cl. *cr.*	**Amazone** . . shd.	2618	328	38½	16	8000 T.S.	Kiel (Germania) .	1900	1901	247,000	2	..	10 *4·1-in.*, 14 M. . .	2 (sub.)	21·5 *t*	560	249
,, ,,	**Arcona** . . shd.	2657	328	38½	16	8000 T.S.	Bremen (Weser) .	1902	1903	254,500	2	..	10 *4·1-in.*, 14 M. . .	2 (sub.)	21·0	700	249
,, ,,	**Ariadne** . . shd.	2618	328	38½	16	8000 T.S.	Bremen (Weser) .	1900	1901	247,000	2	..	10 *4·1-in.*, 14 M. . .	2 (sub.)	22·0	560	249
,, ,,	**Augsburg** . . .	4280	401¾	46	16½	20,000 (tur.)	Kiel . . .	1909	1910	..	2	..	12 *4·1-in.*, 4 *2·1-in.*, 4 M.	2 (sub.)	27	400 900	363
,, ,,	**Berlin.** . . shd.	3200	341	43¼	16½	11,000 T.S.	Danzig . .	1903	1905	254,500	2	..	10 *4·1-in.*, 14 M. . .	2 (sub.)	23·2 *t*	800	286
,, ,,	**Bremen** . . .	3200	341	43¼	16½	10,000 T.S.	Bremen (Weser) .	1903	1904	254,500	2	..	10 *4·1-in.*, 14 M. . .	2 (sub.)	23·0	800	286
,, ,,	**Bussard** (Ersatz)* .	4500	..	..	..	..	Bremen (Weser) .	Bldg.	..	..	..	..	2 *5·9-in.*, 10 *4·1-in.* .	2 (sub.)	25·5	..	..
tw. g. b. .	**Comet** . . .	971	262½	31½	13¾	5000	Stettin (Vulcan) .	1892	1896	..	2	..	4 *3·4-in.*, 2 M. . .	3	21·0 *t*	120	115
3rd cl. *cr.*	**Condor** (Ersatz) * .	4500	..	..	..	..	Wilhelmshaven .	Bldg.	..	..	..	..	2 *6·7-in.*, 10 *4·1-in.* .	2 (sub.)	25·5	..	..
,, ,,	**Cormoran** (Ersatz)* .	4500	..	..	..	..	Bremen (Weser) .	Bldg.	..	..	..	..	2 *6·7-in.*, 10 *4·1-in.* .	2 (sub.)	25·5	..	..
,, ,,	**Danzig** . . .	3200	341	43¼	16½	10,000 T.S.	Danzig . . .	1905	1907	254,500	2	..	10 *4·1-in.*, 14 M. . .	2 (sub.)	23·0	800	286
,, ,,	**Dresden** . . .	3544	364	44¼	15¾	15,000 (tur.)	Hamburg . .	1907	1908	..	2	..	12 *4·1-in.*, 4 *2·1-in.*, 4 M.	2 (sub.)	27·0	400 850	348
g.b. .	**Eber**	977	206¾	30½	10¾	1300 T.S.	Danzig . . .	1903	1904	91,000	..	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13·0	240	121
3rd cl. *cr.*	**Emden** . . .	3544	364	44¼	15¾	15,000 (tur.)	Danzig . . .	1908	1909	..	2	..	10 *4·1-in.*, 4 *2·1-in.*, 4 M.	2 (sub.)	25·0	400 850	320
,, ,,	**Falke** (Ersatz)* . .	4500	..	..	..	..	Stettin (Vulcan) .	Bldg.	..	..	..	..	2 *5·9-in.*, 10 *4·1-in.* .	2 (sub.)	..	..	..
,, ,,	**Frauenlob** . . shd.	2657	328	38½	16	8000 T.S.	Bremen (Weser) .	1902	1904	254,500	2	..	10 *4·1-in.*, 14 M. . .	2 (sub.)	21·0	700	249
2nd cl. *cr.*	**Freya**	5569	344½	57	20¾	10,000 Nic.	Danzig . . .	1897	1898	..	4 N.S.	4 N.S.	2 *8·2-in.*, 6 *5·9-in.*, 14 *3·4-in.*, 4 M.	3 (sub.)	19·5 *t*	825	465

* Programmes 1909, 1910. Particulars uncertain.

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GERMANY.—Cruising Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			kts.	tons.	
3rd cl. *cr.*	Gazelle . . shd.	2603	328	38½	16¾	6400 Nic.	Kiel (Germania) .	1898	1898	225,000	2	..	10 *4·1-in.*, 14 M. . .	3 (1 sub.)	18·0	560	210
„ „	Gefion . . .	3705	344½	42¾	20¾	9000	Danzig (Schichau) .	1893	1894	..	1½	..	10 *4·1-in.*, 6 *2·1-in.*, 4 M.	2	19·0	780	302
„ „	Geier * . . shd.	1597	249½	34¾	15½	2960	Wilhelmshaven .	1894	1896	..	3	..	8 *4·1-in.*, 7 M. . .	..	16·2 t	300	165
„ „	Hamburg . . shd.	3200	341	43¼	16½	11,500 T.S.	Stettin (Vulcan) .	1903	1904	254,500	2	..	10 *4·1-in.*, 14 M. . .	2 (sub.)	23·28 t	800	249
2nd cl. *cr.*	Hansa . . shd.	5791	345½	57¾	21¾	10,000 B.	Stettin (Vulcan) .	1898	1899	..	4 N.S.	4 N.S.	2 *8·2-in.*, 8 *5·9-in.*, 10 *3·4-in.*, 4 M.	3 (sub.)	19·5	825	465
„ „	Hertha . . .	5569	344½	57	21¾	10,000 B.	Stettin (Vulcan) .	1897	1898	..	4 N.S.	4	2 *8·2-in.*, 6 *5·9-in.*, 14 *3·4-in.*, 4 M.	3 (sub.)	19·5 t	825	465
g. b. .	Iltis . . . shd.	881	203½	29¾	10¾	1300 T.	Danzig (Schichau).	1898	1898	100,000	..	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13·5 t	165	121
3rd cl. *cr.*	Irene . . shd.	4224	308	46	21	8000	Stettin (Vulcan) .	1887	1888	220,000	3	..	4 *5·9-in.*, 8 *4·1-in.*, 6 *2·1-in.*, 1 l., 8 M.	3	19·8 t	540	365
g. b. .	Jaguar . . shd.	900	203½	29¾	10¾	1300 T.	Danzig (Schichau).	1898	1899	90,000	..	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13·5 t	165	121
2nd cl. *cr.*	Kaiserin Augusta shd.	5956	387	52½	23	14,000	Kiel (Germania) .	1892	1896	..	3½	..	12 *5·9-in.*, 8 *3·4-in.*, 4 M.	3 (1 sub.)	21·0	850	436
3rd cl. *cr.*	Kolberg . . .	4232	388¼	46	16½	20,000 (tur.)	Danzig (Schichau).	1908	1910	..	2	..	12 *4·1-in.*, 4 *2·1-in.*, 4 M.	2 (sub.)	25·5	400 900	363
„ „	Köln	4280	401¾	46	16½	20,000 (tur.)	Kiel (Germania) .	1909	1910	..	2	..	12 *4·1-in.*, 4 *2·1-in.*, 4 M	4 (sub.)	27·2 t	400 900	363
„ „	Königsberg . .	3350	354¼	43½	15¾	13,200 T.S.	Kiel . . .	1906	1907	..	2	..	10 *4·1-in.*, 8 *2·1-in.*, 4 M.	2 (sub.)	23·5	400 850	295
„ „	Leipzig . . .	3200	341	43¼	16½	11,000	Bremen (Weser) .	1905	1906	254,500	2	..	10 *4·1-in.*, 14 M. . .	2 (sub.)	23·0	800	286
„ „	Lübeck . . .	3200	341	43¼	16½	14,000 T.S. tur.	Stettin (Vulcan) .	1904	1906	254,500	2	..	10 *4·1-in.*, 14 M. . .	2 (sub.)	23·0	800	286
g. b. .	Luchs	962	206¾	30¼	10¾	1300 T.S.	Danzig . . .	1899	1900	91,000	2	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13·5 t	240	121
3rd cl. *cr.*	Mainz	4232	388¼	46	16½	20,000 (tur.)	Stettin (Vulcan) .	1909	1910	..	2	..	12 *4·1-in.*, 4 *2·1-in.*, 4 M.	2 (sub.)	28·0 t	400 900	363

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3rd cl. *cr.*	**Medusa** . . shd.	2618	328	38½	16	8000 T.S.	Bremen (Weser) .	1900	1901	247,000	2	..	10 *4·1-in.*, 14 M. . .	2 (sub.)	22·0	560	249
„ „	**München** . . shd.	3200	341	43½	16½	11,000 T.S.	Bremen (Weser) .	1904	1905	254,500	2	..	10 *4·1-in.*, 14 M. . .	2 (sub.)	23·4 *t*	800	286
„ „	**Niobe** . . . shd.	2603	328	38½	15	8000 T.S.	Bremen (Weser) .	1899	1901	217,500	2	..	10 *4·1-in.*, 14 M. . .	2 (sub.)	20·0	560	250
„ „	**Nymphe** . . shd.	2618	328	38½	15	8000 T.S.	Kiel (Germania) .	1899	1901	217,500							
„ „	**Nürnberg** . . .	3396	354½	43½	15¾	13,200 T.S.	Kiel . . .	1906	1908	..	2	..	10 *4·1-in.*, 8 *2·1-in.*, 4 M.	2 (sub.)	23·5	400 850	295
g. b. .	**Panther** . . .	962	206¾	30½	10¾	1300 T.S.	Danzig . . .	1901	1902	91,000	..	..	8 *8·4-in.*, 6 *1·4-in.*, 2 M.	..	13·5 *t*	240	121
cr. .	**Pelikan** (mining ship) .	2215	259	38	14½	3000	Kiel . .	1890	1891	..	..	..	4 *3·4-in.*, 4 M. . .	..	15·4 *t*	370	183
3rd cl. *cr.*	**Prinzess Wilhelm** shd.	4224	339½	46	21	8000	Kiel (Germania) .	1887	1888	220,000	3	..	4 *5·9-in.*, 8 *4·1-in.*, 6 *2·1-in.*, 4 M.	3 (1sub.)	18·7 *t*	540	365
„ „	**Seeadler** * . . .	1614	246	33½	15	2800	Hamburg . .	1892	1892	..	3	..	8 *4·1-in.*, 7 M. . .	2	16·0	300	165
„ „	**Stettin** . . .	3396	354½	43½	15¾	13,200 T.S. tur.	Stettin (Vulcan) .	1907	1907	..	2	..	10 *4·1-in.*, 8 *2·1-in.*, 4 M.	2 (sub.)	23·5	400 850	295
„ „	**Stuttgart** . . .	3396	354½	43½	15¾	13,200 T.S. tur.	Kiel . . .	1906	1908	..	2	..	10 *4·1-in.*, 8 *2·1-in.*, 4 M.	2 (sub.)	23·3 *t*	400 850	295
„ „	**Thetis** . . . shd.	2618	344½	38½	16	8000 T.S.	Danzig . . .	1900	1901	247,000	2	..	10 *4·1-in.*, 14 M. . .	2 (sub.)	21·8 *t*	560	249
g. b. .	**Tiger**	962	203½	29¾	10	1300 T.S.	Danzig . . .	1899	1900	..	..	..	8 *8·4-in.*, 6 *1·4-in.*, 2 M.	..	13·5 *t*	240	121
3rd cl. *cr.*	**Undine** . . shd.	2657	328	38½	16	8000 T.S.	Kiel (Howaldt) .	1902	1904	254,500	2	..	10 *4·1-in.*, 14 M. . .	2 (snb.)	21·0	700	249
2nd cl. *cr.*	**Victoria Luise** . .	5569	344½	57	21¾	10,000 Dürr.	Bremen (Weser) .	1897	1898	..	4 H.S.	4 H.S.	2 *8·2-in.*, 6 *5·9-in.*, 14 *8·4-in.*, 4 M.	3 (sub.)	19·5 *t*	825	465
„ „	**Vineta** . . shd.	5791	345½	57¾	21¾	10,000 Dürr.	Danzig . . .	1897	1899	..	4 H.S.	4 H.S.	2 *8·2-in.*, 8 *5·9-in.*, 10 *3·4-in.*, 4 M.	3 (sub.)	19·5 *t*	825	465

The Imperial Yacht Hohenzollern, 4187 tons, 9460 I.H.P., 22 knots, carries 3 4·1-in., 12 1·9-in. Q.F. and 4 M. River gunboats for China, the Tsingtau, Vaterland Vorwärtz (168 tons), Otter (270 tons). The mining vessels Nautilus and Albatross (2000 tons). Gunnery tender Drache, 765 tons, 15 knots. Submarine salvage vessel Vulkan.

N.B.—The minor armament of the new small cruisers is taken from the 1910 "Nauticus."

* The programme for 1911 includes two cruisers to replace the Geier and Seeadler.

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Merchant Cruisers (Auxiliaries to the German Navy).

To what Company belonging.	Name of Ship.	Register Tonnage.	Length.	Beam.	Draught of Water.	Indicated H.P.	Ocean Speed.	When Built.	Armament of each Ship.
		tons.	ft. in.	ft. in.	ft. in.		knots.		
North German Lloyd	Kronprinzessin Caecilie	19,500	678 0	72 0	29 0	45,000	23½	1906	The armament is of 6-in. and smaller quick-firers.
	Kaiser Wilhelm II.	19,500	678 0	72 0	29 0	45,000	23½	1901	
	Kronprinz Wilhelm	14,800	640 0	66 0	26 3	30,000	23	1901	
	Kaiser Wilhelm der Grosse	14,349	625 0	66 0	27 0	30,000	23	1897	
	Trave	5262	436 6	48 0	..	7500	18	1886	
Hamburg-America	Deutschland	16,500	662 6	67 0	..	37,000	23½	1900	

Many other vessels of less than 18 knots speed are in the list, including the Berlin (19,200 register tons), 17 knots, launched at Gröpelingen, 1908.

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GREECE.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a c.	**Giorgios Averoff**	9956	429¾	68¾	24¾	20,000 B	Leghorn (Orlando)	1910	1911	950,750	8–3½ K.S.	1¾	7	7	7–6	..	4 *9·2-in.*, 8 *7·5-in.*, 16 *3-in.*, 8 *1·8-in.*	3 (sub.)	24·0	700 / 1600	..
b.	**Hydra** . .	4808	334½	51¾	23¼	7000	St. Nazaire	1889	1891	..	11¾–4	2½	3	..	13½	..	3 *10·6-in.* Canet, 5 *5·9-in.*, 1 *3·9-in.*, 8 *2·5-in.*, 4 *1·8-in.*, 12 *1·4-in.*	3	17·0	600	400
,,	**Psara** . . .	4808	334½	51¾	23¼	7000	La Seyne . Havre . . La Seyne .	1890	1900 1892 1897	..	11¾–4	2½	3	..	13½	..					
,,	**Spetsai** . .	4808	334½	51¾	23¼	7000	Havre . . La Seyne .	1889	1891 1900	..	11¾–4	2½	3	..	13½	..					

GREECE.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.						in.	in.			knots.	tons.	
g.v.	**Acheloos** . . .	420	130	24½	11½	400	Blackwall .	1884	1885	..	..	..	2 *3·7-in.* (K.), 3 M.. . ..		10·0	50	..
,,	**Alphios** . . .	420	130	24½	11½	400	Blackwall .	1884	1885	..	..	..	2 *3·7-in.* (K.), 3 M.. . ..		10·0	50	..
,,	**Eurotas** . . .	420	130	24½	11½	400	Dumbarton .	1884	1885	..	..	..	2 *3·7-in.* (K.), 3 M.. . ..		10·0	50	..
corv.	**Sfaktirea** . . .	1000	216½	29¼	18	2400	England . .	1885	1886	..	..	..	2 *3·9-in.* (K.), 2 M.. . ..		14·5	100	..

Torpedo depôt-ship.—Kanaris, 1100 tons, 500 I.H.P., 2 3·9-in. (Krupp) guns, 14 knots speed. Gunboats, Ambrakia and Aktion, of 440 tons displacement, 380 horse-power, 10 knots speed, fitted with 1 10·2-in. Krupp gun and 2 machine guns; launched 1885.

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ITALY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.		Guns.	Torpedo Tubes.			
															Heavy Guns.	Secondary.					
		tons.	ft.	ft.	ft.					£	in.	ins.	ins.	ins.	ins.	ins.			knots.	tons.	
a.c.	Amalfi . . .	9956	429¾	68¾	24¾	20,800 B.	Genoa (Odero)	1908	1909	880,000	8–3½ K.S.	1¾	7 K.S.	7 K.S.	7-6 K.S.	..	4 *10-in.*, 8 *7·5-in.*, 16 *3-in.*, 2 M.	3 (sub.)	23·6 *t*	700 / 1500	..
b.	Ammiraglio di St. Bon	9645	344½	69¼	24¾	13,500	Venice . .	1897	1901	..	9¾–4 H.S.	3–1½	6 H.S.	6 H.S.	9¾ H.S.	6 H.S.	4 *10-in.*, 8 *6-in.*, 8 *4·7-in.*, 2 *2·9-in.*, 8 *2·2-in.*, 12 *1·4-in.*, 2 M.	4	18·3 *t*	600	548
b.	Benedetto Brin . .	13,214	426½	78¼	27¼	20,400 B.	Castellammare	1901	1905	..	6–2 H.S.	3	6 H.S.	8 H.S.	10 H.S.	6 H.S.	4 *12-in.*, 4 *8-in.*, 12 *6-in.*, 16 *3-in.*, 8 *1·8-in.*, 4 M.	4 (sub.)	19·5 *t*	1000 / 2000	811
a.c.	Carlo Alberto . .	6396	325	59	23	13,220 *t*	Spezia . .	1896	1898	..	6–4½ H.S.	1½	6 H.S.	..	6 H.S.	4½ shields	12 *6-in.*, 6 *4·7-in.*, 2 *2·9-in.*, 10 *2·2-in.*, 10 *1·4-in.*, 2 M.	4	19·2 *t*	1000	500
b.	Conte di Cavour * .	21,500	530	91¾	27¾	24,000	Spezia . .	Bldg.	..	..	8¼	1¾	..	..	9	..	13 *12-in.*, 18 *4·7-in.*, 14 *12-pr.*	3 (sub.)	22·5	..	..
b.	Dante Alighieri† .	18,300	505	85	27½	26,000 Parsons Bl.	Castellammare	1910	..	..	10–6 K.S.	..	..	..	10 K.S.	..	12 *12-in.*, 20 *5·5-in.*, 13 *12-pr.*	3 (sub.)	23	..	..
b.	Emanuele Filiberto .	9645	344½	69¼	24¾	13,500	Castellammare	1897	1901	..	9¾–4 H.S.	3–1	6 H.S.	6 H.S.	9¾ H.S.	6 H.S.	4 *10-in.*, 8 *6-in.*, 8 *4·7-in.*, 2 *2·9-in.*, 8 *2·2-in.*, 12 *1·4-in.*, 2 M.	4	18·3 *t*	600	536
a.c.	Francesco Ferruccio	7294	344	59¾	23¼	13,500 Nic.	Venice . .	1902	1904	..	6–3 H.S.	1½	6 H.S.	5 H.S.	6 H.S	6 H.S	1 *10-in.*, 2 *8-in.*, 14 *6-in.*, 10 *2·9-in.*, 6 *1·8-in.*, 2 M.	4 (sub.)	20·0	655 / 1200	540
a.c.	Giuseppe Garibaldi					14,713 *t* Nic.	Sestri-Ponente (Ansaldo)	1899	1901												
b.	Giulio Cesare * .	21,500	530	91¾	27¾	24,000	Sestri-Ponente (Ansaldo)	Bldg.	..	..	8¼	1¾	..	..	9	..	13 *12-in.*, 18 *4·7-in.*, 16 *12-pr.*	3 (sub.)	22·5	..	..
b.	Leonardo da Vinci *					24,000	Genoa (Odero)	Bldg.													
a.c.	Marco Polo . .	4511	327	48¼	19½	10,543 *t*	Castellammare	1892	1894	344,400	4	1	4	4	4	..	6 *5·9-in.*, 10 *4·7-in.*, 2 *2·9-in.*, 9 *2·2-in.*, 4 *1·4-in.*, 2 M.	4 (1sub.)	19·0 *t*	600	394
b.	Napoli . .	12,425	435½	73½	27¼	20,000 B.&W.	Castellammare	1905	1909	1,120,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 *12-in.*, 12 *8-in.*, 12 *3-in.*, 12 *1·8-in.*	2 (sub.)	22·0	1000 / 2000	711
b.	Regina Elena .					20,000 B.	Spezia . .	1904	1907												

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a.c.	**Pisa**	9956	429¾	68¾	24¾	18,000 B.	Leghorn (Orlando)	1907	1909	..	8–3½ K.S.	1¾	7 K.S.	7 K.S.	7–6 K.S.	..	4 *10-in.*, 8 *7·5-in.*, 16 *3-in.*, 2 M.	3 (sub.)	23·0	700/1600	..
b.	**Regina Margherita**	13,214	426½	78¼	27¼	20,664 Nic.	Spezia	1901	1904	..	6 H.S.	3	6 H.S.	8 H.S.	8 H.S.	6 H.S.	4 *12-in.*, 4 *8-in.*, 12 *6-in.*, 16 *3-in.*, 8 *1·8-in.*, 4 M.	4 (sub.)	20·2 *t*	1000/2000	811
,,	**Re Umberto**	13,673	400	76¾	28½	19,500	Castellammare	1888	1893	1,058,500	4	3	4	2¾	18	..	4 *67-ton* (A.), 8 *6-in.*, 16 *4·7-in.*, 2 *9-in.*, 15 *2·2-in.*, 14 *1·4-in.*, 2 M.	5	19·0	1200	785
,,	**Roma**	12,425	435½	73½	27¼	20,000 B. & W.	Spezia	1907	1909	1,120,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 *12-in.*, 12 *8-in.*, 12 *3-in.*, 12 *1·8-in.*	2	22·0	1000/2000	711
a.c.	**San Giorgio** / **San Marco**	9832	429¾	68¾	24¾	18000 Bl. / 18000 tur.	Castellammare	1908	..	..	8–3½ K.S.	1¾	7 K.S.	7 K.S.	7–6 K.S.	7 K.S.	4 *10-in.*, 8 *7·5-in.*, 16 *3-in.*, 8 *1·8-in.*	3 (sub.)	22·5	700/1600	643
b.	**Sardegna**	13,640	411	76¾	28½	19,650 *t*	Spezia	1890	1895	1,057,440	4	3	4	2¾	14¼ *comp.*	..	4 *67-ton* (A.), 8 *5·9-in.*, 16 *4·7-in.*, 2 *2·9-in.*, 20 *2·2-in.*, 10 *1·4-in.*, 2 M.	5	20·1 *t*	1200	785
,,	**Sicilia**	13,087	400	76¾	28½	19,500	Venice	1891	1895	1,050,000	4	3	4	2¾	18 *comp.*	..	4 *67-ton* (A.), 8 *5·9-in.*, 16 *4·7-in.*, 2 *2·9-in.*, 20 *2·2-in.*, 10 *1·4-in.*, 2 M.	5	19·2 *t*	1200	785
a.c.	**Varese**	7294	344	59¾	23⅓	13,500 B.	Leghorn (Orlando)	1899	1901	..	6–4½ H.S.	1½	6 H.S.	5 H.S.	6 H.S.	6 H.S.	1 *10-in.*, 2 *8-in.*, 14 *6-in.*, 10 *2·9-in.*, 6 *1·8-in.*, 2 M.	4	20·0	650/1200	500
a.c.	**Vettor Pisani**	6396	325	59	23	13,000	Castellammare	1895	1897	..	6 H.S.	1½	6 H.S.	..	6 H.S.	4½ shields	12 *6-in.*, 6 *4·7-in.*, 2 *2·9-in.*, 10 *2·2-in.*, 10 *1·4-in.*, 2 M.	4	20·0	600	504
b.	**Vittorio Emanuele III**	12,425	435½	73½	27¼	20,000 B.	Castellammare	1904	1907	1,120,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 *12-in.*, 12 *8-in.*, 12 *3-in.*, 12 *1·8-in.*	2 (sub.)	22·0	1000/2000	711

* Particulars of armament uncertain.

† Particulars doubtful.

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ITALY.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armaments.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
to.cr.	**Agordat**	1292	287½	30½	11	8000	Castellammare	1899	1900	..	1	..	4 4·7-*in.*, 8 2·2-*in.*, 2 1·4-*in.*	2	22·0	160	158
to.g.b.	**Aretusa**	833	230	26¾	11¾	4420	Leghorn (Orlando).	1891	1892	72,920	1	..	1 4·7-*in.*, 6 2·2-*in.*, 3 1·4-*in.*	6	20·7 *t*	120	111
3rd cl. *cr.*	**Calabria**	2428	249½	42	16¾	4094 *t*	Spezia	1894	1897	183,120	2	◆	4 5·9-*in.*, 6 4·7-*in.*, 1 2·9-*in.*, 8 2·2-*in.*, 8 1·4-*in.*, 2 M.	2	16·4 *t*	500	257
to.cr.	**Coatit**	1292	287½	30½	11	8160	Castellammare	1899	1902	..	1	..	4 4·7-*in.*, 8 2·2-*in.*, 2 1·4-*in.*	2	21·1 *t*	160	158
3rd cl. *cr.*	**Elba** shd.	2689	272½	40¾	16½	7471 *t*	Castellammare	1893	1895	200,000	2	4½	2 5·9-*in.*, 8 4·7-*in.*, 8 2·2-*in.*, 2 1·4-*in.*, 1 M.	2	17·9 *t*	500	272
„ „	**Etruria**	2245	262½	39½	16½	7585 *t*	Leghorn (Orlando)	1891	1893	183,120	2	4½	4 5·9-*in.*, 6 4·7-*in.*, 1 2·9-*in.*, 8 2·2-*in.*, 10 1·4-*in.*, 2 M.	2	19·8¼ *t*	400	257
g.v.	**Governolo**	1235	185	33¾	13¾	1100	Venice	1894	1896	58,440	..	..	4 4·7-*in.*, 4 2·2-*in.*, 2 1·4-*in.*, 2 M.	..	13·0	200	131
to.g.b.	**Iride**	931	229½	27	10¼	4242	Castellammare	1891	1892	72,920	1	..	1 4·7-*in.*, 6 2·2-*in.*, 3 1·4-*in.*	6	19·6 *t*	120	111
3rd cl. *cr.*	**Liguria**	2245	262½	39½	16¾	7677 *t*	Sestri (Ansaldo)	1893	1894	183,120	2	4½	4 5·9-*in.*, 6 4·7-*in.*, 1 2·9-*in.*, 8 2·2-*in.*, 10 1·4-*in.*, 2 M.	2	19·6 *t*	430	257

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Scout .	**Marsala** . .	3400	460½	42¾	13¼	22,500 Bl.	Castellammare .	Bldg.	..	..	..	..	6 *4·7-in.* and 6 *12-pr.*	3	27·0	..	..
to g.b. .	**Minerva** . .	833	246	27½	11⅜	4800 W.T.	Sestri (Ansaldo) .	1892	1893	72,720	1	..	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	5	21·0	120	111
to.g.b. .	**Montebello** (miner).	801	230	25½	11¾	2776	Spezia . . .	1888	1899	74,120	..	1	6 *2·2-in.*, 2 *1·4-in.* . .	4	18·0	100	111
Scout .	**Nino Bixio** . .	3400	460½	42¾	13¼	22,500 Bl.	Castellammare .	Bldg.	..	..	..	..	6 *4·7-in.* and 6 *12-pr.*	3	27·0	..	..
to.g.b. .	**Partenope** (miner) .	821	246	27½	11⅜	Cur. t. 4200	Castellammare .	1890	1890	71,000	..	1	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	4	19·0	100	111
3rd cl. *cr.*	**Puglia** . . .	2498	269	41	16¾	7000	Taranto. . .	1898	1900	200,000	4½	1	4 *5·9-in.*, 6 *4·7-in.*, 1 *2·9-in.*, 8 *2·2-in.*, 8 *1·4-in.*, 2 M.	2	20·0	650	257
Scout .	**Quarto** . . .	3400	460½	42¾	13¼	22,500 Bl.	Venice . . .	Bldg.	..	..	..	..	6 *4·7-in.* and 6 *12-pr.*	3	27·0	..	..
3rd cl. *cr.*	**Umbria** . .	2245	262½	39½	16½	7104	Leghorn (Orlando). .	1891	1893	183,120	4½	2	4 *5·9-in.*, 6 *4·7-in.*, 8 *2·2-in.*, 10 *1·4-in.*, 1 l., 2 M.	2	18·83 *t*	430	257

Etna (3474 tons), converted into a training ship. Goito and Tripoli, mining vessels. ***Subsidised auxiliary cruisers and despatch vessels.***—Nord America (La Veloce S.S. Co.), Regina Margherita, Galileo Galilei, Marco Polo, Umberto I., Cristoforo Colombo, Elettrico, Candia, Malta, Perseo, Orione, and some others (Navigazione Generale), Principessa Mafalda (18½ knots) Italian Lloyd. The armament of these vessels is 2 2·2-in. Q.F., and 4 1·4-in. M. The coal and liquid fuel transports Bronte and Steropo (9490 tons) are completed. Provision is made for a docking vessel for submarines, and a river gunboat. The lagoon gunboat Brondolo is completed, and the Marghera to be completed in 1911.

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JAPAN.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.						in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Adzuma** . .	9436	431½	59½	24¾	17,000 B.	St. Nazaire .	1899	1901	..	7–3½ H. S.	3	5 H.S.	..	6 H. S.	6 H.S.	4 *8-in.*, 12 *6-in.*, 12 *3-in.*, 8 *1·8-in.*	5 (4 sub.	20·0	600 1275	482
b.	**Aki** . . .	19,800	482	83½	27½	18,000 My. tur.	Kure . .	1907	1911	..	9–5 K. S.	2–3	8	..	9	6	4 *12-in.*, 12 *10-in.*, 8 *6-in.*, 8 *12-pr.*, 4 M.	5 (4 sub.)	20·5	..	940
,,	**Asahi** . . .	15,800	400½	75½	27½	15,000 B.	Clydebank .	1899	1900	..	9–4 H. S.	4–2½	6 H.S.	12 H.S.	14 H. S.	6 H.S.	4 *12-in.*, 14 *6-in.*, 20 *12-pr.*, 8 *3-pr.*, 4 *2½-pr.*	4 (sub.)	18	700 1549	750
a.c.	**Asama** . . .	9700	408	67	24¼*	19,000 *t*	Elswick .	1898	1899	..	7–3½ H. S.	2	5 H.S.	..	6	6 H.S.	4 *8-in.*, 14 *6-in.* (A.), 12 *12-pr.*, 8 *2½-pr.*	5 (4 sub.)	22·1 *t*	600 1409	482
,,	**Aso** (*ex* Bayan) .	7726	443	55¾	22	17,400 My. *t.*	La Seyne .	1900	1902	..	8–3 K.S.	2	3 K.S.	..	7 K.S.	3 K.S.	2 *8-in.*, 8 *6-in.*, 32 *2·9-in.*, 20 *3-pr.*, 6 *1-pr.* 3l., and M.	2 (sub.)	22 *t*	750 11,000	570
a.c.	**Chiyoda** . .	2450	308	42½	14	5700 B.	Clydebank .	1889	1890	..	4½	1–2	..	..	..	..	10 *4·7-in.*, 14 *3-pr.*, 3 M. .	3	17·5	420	300
b.	**Fuji** . . .	12,320	374	73	26½	14,000	Thames .	1896	1897	..	18–6 H. S.	4–2½	4 H.S.	..	14 H. S.	6 H.S.	4 *12-in.*, 10 *6-in.*, 20 *3-pr.*, 4 *4½-pr.*	5 (4 sub.)	19·2 *t*	1100	600
,,	**Hizen** (*ex* Retvizan)	12,700	374	72¼	25	16,000 My.	Philadelphia	1900	1902	..	9–4 K.S.	4	6-2 K.S.	9 K.S.	10 K.S.	5 K.S.	4 *12-in.*, 12 *6-in.*, 20 *3-pr.*, 6 *1-pr.*	2	18·0	800 2000	778
a.c.	**Ibuki** . . .	14,620	450½	75½	26¼	27,000 My. tur.	Kure . .	1907	1909	..	7–4 K.S.	2	5 K.S.	..	9 K.S.	..	4 *12-in.*, 8 *8-in.*, 14 *4·7-in.*, 3 *1·8-in.*, 2 l., 4 M.	3 (sub.)	22	2000	820
b	**Idzumo** .	9750	400	68½	24¼*	17,300 B. *t.*	Elswick	1899	1900	..	7–3½ H.N.S.	2½	5 H. N.S.	..	6 H. N.S.	6 H. N.S.	4 *8-in.*, 14 *6-in.*, 12 *12-pr.*, 8 *2½-pr.*	4 (sub.)	22·0 21·7 *t*	600 1412	672
,,	**Iwate** . .							1900	1901												
b.	**Iki** (*ex* Nicolai I) .	9672	326	67	23	8000 B.	St.Petersburg	1888	1892	..	14–6 *comp.*	2½	..	..	10 *comp.*	6 *comp.*	2 *12-in.*, 4 *9-in.*, 8 *6-in.*, 12 Q.-F., 8 M., 4 l.	6	14·8 *t*	..	600
a.c.	**Ikoma** . .	13,750	440	75	26	20,500 My.	Kure . .	1906	1908	..	7–5 K.S.	..	..	..	7 K.S.	..	4 *12-in.*, 12 *6-in.*, 12 *4·7-in.*, 2 *1·8-in.*, 2 l., 4 M.	3 (sub.)	21·0	600 2000	817
b.	**Iwami** (*ex* Orel) .	13,516	367½	76	26	16,000 My.	St.Petersburg (Galerny)	1902	1904	..	9–4 K.S.	2½–1½	6 K.S.	9 K.S.	10 K.S.	6 K.S.	4 *12-in.*, 6 *8-in.*, 20 *3-in.*, 20 *3-pr.*, 6 *1-pr.*	3 (2 sub.)	18·0	800 2000	740
,,	**Kashima** . .	16,400	425	78⅙	26½	17,280 Nic.	Elswick .	1905	1906	..	9–4 K.S.	3–2½	6	6	9 K.S.	6 K.S.	4 *12-in.*, 4 *10-in.*, 12 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 6 M., 2 l.	5 (sub.)	19·2 *t*	750 2150	980

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a.c.	**Kasuga** . .	7630	344	59¾	24¼	13,500	Sestri Ponente	1902	1904	760,000	6 H. N.S.	1½	6 H. N.S.	6 H. N.S.	6 H. N.S.	6 H. N.S.	1 *10-in.*, 2 *8-in.*, 14 *6-in.*, 10 *3-in.*, 6 *1·8 in.*, 2 M.	4	20·0	600 1150	500
b.	**Katori** . . .	15,950	420	78	27*	18,500 *t*, Nic.	Barrow .	1905	1906	..	9–5 K.S.	3–2	6	6	10 K.S.	6 K.S.	4 *12-in.*, 4 *10-in.*, 12 *6-in.*, 10 *12-pr.*, 3 *3-pr.*, 6 M., 2 l.	5 (sub.)	19·5 *t*	750 1800	980
,,	**Kawachi** . .	20,800	480	84	28	26,500 tur.	Kure . .	1910	..	..	12–9½ K.S.	..	..	..	..	..	12 *12-in.*, 10 *6-in.*, 12 *4·7-in.*	5 (sub.)	20·5	..	960
a.c.	**Kurama** . .	14,620	450½	75½	26¼	27,000 My.	Yokosuka .	1907	1911	..	7–4 K. S.	2	5 K.S.	..	9 K. S.	..	4 *12-in.*, 8 *8-in.*, 14 *4·7-in.*, 3 *1·8-in.*, 2 l., 4 M.	3 (sub.)	22·0	2000	820
b.	**Mikasa** . .	15,200	400	76	27¼	16,431 B.	Barrow .	1900	1902	..	9–4 H.N.S.	3	6 H. N.S.	12 H. N.S.	14 H. N.S.	6 H. N.S.	4 *12-in.*, 4 *10-in.*, 10 *6-in.*, 20 *12-pr.*, 12 small, 8 M.‡	4 (sub.)	18·5 *t*	700 1520	935
c.d.	**Minoshima** (*ex* Seniavine)	4792	265	52½	17	5000 My.	St.Petersburg	1894	1895	410,000	10	3	..	..	7–8	..	4 *10-in.*, 4 *4·7-in.*, 6 *1·8-in.*, 8 M.	4	16·0	400	318
a.c.	**Nisshin** . .	7630	344	59¾	24¼	13,500	Sestri Ponente	1903	1904	760,000	6 H. N.S.	1½	6 H. N.S.	6 H. N.S	6 H. N.S.	6 H. N.S.	4 *8-in.*, 14 *6-in.*, 10 *3-in.*, 6 *1·8-in.*, 2 M.	4	20·0	600 1150	500
c.d.	**Okinoshima** (*ex* Apraxine)	4126	277½	52½	17½	5757 *t*.	St.Petersburg (New Admiralty)	1896	1898	..	10 H. S.	3	..	..	7¾ K. S.	..	3 *10-in.*, 4 *4·7-in.*, 10 *1·8-in.*, 12 *1·4-in.*	4	15·0 *t*	215	318
b.	**Sagami** (*ex* Peresviet)	12,674	401¼	71¾	26	14,500 My.	St.Petersburg (Baltic)	1898	1901	..	9–7 H. S.	2¾	6 H. S.	9 H. S.	9 H. S.	6 H. S.	4 *12-in.*, 10 *6-in.*, 16 *12-pr.*, 10 *3-pr.*, 17 *1-pr.*	2 (sub.)	18·0	800 2056	732
,,	**Satsuma** . .	19,350	482	83½	27½	18,000 My.	Yokosuka .	1906	1910	..	9–5 K. S.	2–3	8	..	9	6	4 *12-in.*, 12 *10-in.*, 12 *4·7-in.*, 4 *12-pr.*, 4 M.	5 (sub.)	20·5	1000 2500	940
,,	**Settsu** . . .	20,800	480	84	28	26,500 tur.	Yokosuka .	Bldg.	..	..	12–9½ K.S.	...	..	..	..	..	12 *12-in.*, 10 *6-in.*, 12 *4·7-in.*	5 (sub.)	20·5	..	960
,,	**Shikishima** . .	14,850	400	75¼	26½	16,355 B.	Thames .	1898	1899	..	9–4 H.N.S.	4–2½	6 H. N.S.	12 H. N.S.	14	6 H. N.S.	4 *12-in.*, 14 *6-in.*, 20 *12-pr.*, 8 *3-pr.*, 4 *2½-pr.*, 8 M.	5 (4 sub.)	18·3	700 1722	741
,,	**Suo** (*ex* Pobieda) .	12,674	401¼	71½	26	14,500 My.	St.Petersburg (Baltic)	1900	1901	..	9½–4 H. S.	2¾	9 H. S.	9 H. S.	9 H. S.	6 H. S.	4 *12-in.*, 10 *6-in.*, 16 *12-pr.*, 10 *3-pr.*, 17 *1-pr.*, 2 l.	2 (sub.)	18·0	800 2056	732
,,	**Tango** (*ex* Poltava)	10,960	367½	69	26	11,255 My.	St.Petersburg	1894	1898	1,098,000	15¾	3½	4	9	10 H. S.	6	4 *12-in.*, 12 *6-in.*, 14 small	..	16·0	900	700
a.c.	**Tokiwa** . .	9700	408	67	24¼*	20,556 *t*.	Elswick .	1898	1899	..	7–3½ H. S.	2	5 H.S.	..	6 H. S.	6 H.S.	4 *8-in.*, 14 *6-in.* (A.), 12 *12-pr.*, 8 *2½-pr.*	5 (4 sub.)	23·0	600 1409	500
,,	**Tsukuba** . .	13,750	440	75	26	20,500 My.	Kure . .	1905	1907	..	7–5 K. S.	..	..	..	7 K. S.	..	4 *12-in.*, 12 *6-in.*, 12 *4·7-in.*, 2 *1·8 in.*, 2 l., 4 M.	3 (sub.)	21·0	600 2000	817
,,	**Yakumo** . .	9850	407¾	64¼	23¾	16,000 B.	Stettin .	1899	1901	..	7–3½ H. S.	2½	5 H.S.	..	6 H. S.	6 H.S.	4 *8-in.* (A.), 12 *6-in.*, 12 *12-pr.* (A.), 8 *2½-pr.*	5 (4 sub.)	20·0	600 1100	500
c.b.	**Unnamed** † . .	27,500	..	..	..	tur.	Barrow .	Bldg.	..	2,500,000	..	..	..	..	..	..	..	..	..	..	..

* Mean draught. † Characteristics not disclosed. ‡ As reconstructed.

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JAPAN.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
g.v.	Akagi	615	164	27	10	700	Yokosuka	1889	1891	..	..	..	1 *8·2-in.*, 1 *5·9-in.*, 2 l., 2 M.	..	13·0	60	113
cr.	Akashi	2657	295½	41¾	16½	8500	Yokosuka	1897	1898	327,000	2	4½ shield	2 *6-in.* (A.), 6 *4·7-in.*, 10 *3-pr.*, 2 *2½-pr.*, 4 M.	2	20·0	200 / 544	300
„	Akitsushima	3150	302	42½	18½	8400	Yokosuka	1892	1893	..	3	..	4 *6-in.*, 6 *4·7-in.*, 10 *3-pr.*	4	19·0	..	330
t.g.b.	Chihaya	1250	273	31½	10	5500 Nor.	Yokosuka	1900	1901	..	..	..	2 *4·7-in.*, 4 *12-pr.*	5	21·0	123 / 344	170
cr.	Chitose	4760	395	49	18	15,500	San Francisco	1898	1899	205,200	4½	4½ shield	2 *8-in.*, 10 *4·7-in.*, 12 *12-pr.*, 6 *2½-pr.*	4	22·5	350 / 1000	405
„	Hashidate*	4277	295	50¾	21¼	5400 My.	Yokosuka	1891	1893	..	2	12	1 *12·5-in.* (Canet), 11 *4·7-in.*, 5 *6-pr.*, 11 *3-pr.*, 6 M.	4	17·0	400	350
„	Hirado	4800	..	..	..	22,500 turbines My.	Kobe	Bldg.	..	..	..	..	6 *6-in.*, 4 *3-in.*, 4 M.	2 (sub.)	26	500 / 1000	..
„	Itsukushima*	4277	295	50¾	21½	5400 B.	La Seyne	1891	1893	..	2	12	1 *12·5-in.* (Canet), 11 *4·7-in.*, 5 *6-pr.*, 11 *3-pr.*, 6 M.	4	17·0	400	350
„	Kasagi	4760	374½	48¾	19	13,492	Philadelphia	1898	1899	205,200	4½–1¾	4½ shield	2 *8-in.*, 10 *4·7-in.*, 12 *12-pr.*, 6 *1·8-in.*	4	22·7	350 / 1000	405
t.g.b.	Makigumo (*ex* Posadnik)	400	192½	24¼	7½	3600	Elbing	1892	1892	111,000	..	..	2 *1·8-in.*, 7 *1·4-in.*, 3 M.	3	22·0 *t*	90	87
Scout	Mogami	1329	316	31½	9¾	8000 turbines	Sasebo	1907	1908	..	2½	..	2 *4·7-in.*, 4 *12-pr.*	2	23·0	..	180
cr.	Naniwa*	3700	300	46	18½	7235	Elswick	1885	1886	..	3	1½ shield	8 *6-in.*, 2 *3-pr.*, 10 M.	4	18·72 *t*	800	350
„	Niitaka	3365	235½	44	16½	10,000 Nic.	Yokosuka	1902	1905	..	2½	..	6 *6-in.*, 10 *3-in.*, 4 *2½-pr.*	..	20·0	600	..

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cr.	**Otawa**	3000	341	42½	17	10,000 My.	Yokosuka	1903	1904	..	..	..	2 *6-in.*, 6 *4·7-in.*, 4 *12-pr.*, 2 M., 2 l.	..	20·0	600/875	..
t.g.b.	**Shikinami** (*ex* Gaidamak)	400	192½	24¼	7½	3000	Abo, Finland	1893	1894	..	..	..	2 *1·8-in.*, 7 *1·4-in.*, 10 M.	3	22·0	90	87
cr.	**Shikuma**	4800	..	..	..	22,500 turbines My.	Sasebo	Bldg.	..	..	..	..	6 *6-in.*, 4 *3-in.*, 4 M.	2 (sub.)	26	500/1000	..
,,	**Soya** (*ex* Varyag)	6500	420	52	20⅝	20,000 My.	Philadelphia	1899	1900	..	3	..	12 *6-in.*, 12 *12-pr.*, 6 *3-pr.*	3 (sub.)	23·0	770/1250	571
,,	**Suma**	2657	306¾	40	16¼	8500	Yokosuka	1896	1898	237,000	2 shield	4½ 4 M.	2 *6-in.*, 6 *4·7-in.*, 12 *3-pr.*	2	20·0	200	300
,,	**Sutsuya** (*ex* Novik)	3080	347	41½	16	18,000 My.	Danzig (Schichau)	1900	1902	..	2	..	2 *4·7-in.*, 8 other Q.F. and M.	2	25·0	600	..
,,	**Takao**	1774	230	33	13	2330	Yokosuka	1888	1889	..	..	..	4 *6-in.*, 1 *4·7-in.*, 6 M.	..	15·0	300	255
,,	**Takachiho***	3700	300	46	18½	7500	Elswick	1885	1886	..	3	1½ shield	2 *10·2-in.* (A.), 6 *6-in.*, 2 *8-pr.*, 10 M.	4	18·7 *t*	800	365
t.g.b.	**Tatsuta***	875	240	27½	13	5500	Elswick	1894	1894	..	..	..	2 *4·7-in.*, 4 *3-pr.*	5	21·0	200	..
cr.	**Tone**	4035	400	48½	16¾	15,000 My.	Sasebo	1907	1908	..	2–3	..	2 *6-in.*, 10 *4·7-in.*, 2 *12-pr.*	3	23·0	750/1000	392
Scout	**Tsugaru** (*ex* Pallada)	6630	413¼	55¾	21	11,610 My.	St. Petersburg (Galerny)	1899	1902	..	2½	..	8 *6-in.*, 20 *12-pr.*, 8 *1-pr.*	4	20·0	900/1400	422
,,	**Tsushima**	3365	235½	44	16½	10,000 Nic.	Kure	1902	1904	..	2½	..	6 *6-in.*, 10 *3-in.*, 4 *2½-pr.*	..	20·0	600	..
g.b.	**Uji**	620	180	27¾	10	1000 B.	Kure	1903	1905	..	..	..	4 *12-pr.*, 3 M.	..	13·0	100	..
cr.	**Yahagi**	4800	..	..	..	22,500 turbines My.	Nagasaki	Bldg.	..	..	..	..	6 *6-in.*, 4 *3-in.*, 4 M.	2 (sub.)	26	500/1000	..
Scout	**Yodo**	1230	300	32	9¾	6500	Sasebo	1908	1909	..	2½	..	2 *4·7-in.*, 4 *12-pr.*	2	22·0	..	..

Amakusa, mining vessel (*ex* Amur).

* Reported to have been removed from the active list.

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NETHERLANDS.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.		Guns.	Torpedo Tubes.			
															Heavy Guns.	Secondary.					
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots	tons.	
c.d.s.t.	**De Ruyter** . .	5014	316¾	51½	21¾	6377 *t.*	Amsterdam .	1900	1904	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	3 H.S.	2 9·4-*in.*, 4 5·9-*in.*, 10 2·9-*in.*, 4 1·4-*in.*	3 2 sub.	16·5 *t*	680	444
„	**Evertsen** . . .	3464	282¾	47	16¾	4735	Flushing .	1894	1896	..	6–4 H.S.	2	..	..	9½ H.S.	3 H.S.	3 8·2-*in.*, 2 5·9-*in.*, 6 2·9-*in.*, 8 1·4-*in.*	3	16·0	280	268
„	**Hertog Hendrik** .	5014	316¾	51½	21¾	6000 Y.	Amsterdam .	1902	1903	347,500	6 H.N.S.	2	..	..	10 H.N.S.	3 H.S.	2 9·4-*in.*, 4 5·9-*in.*, 10 2·9-*in.*, 4 1·4-*in.*, 2 1.	3	16·5	680	444
t. & b.	**Jacob van Heemskerck**	5211	316¾	51½	21¾	6000 Y	Amsterdam	1906	1908	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	..	2 9·4-*in.*, 6 5·9-*in.*, 10 12-*pr.*, 4 1·4-*in.*, 2 1.	3 2 sub	16·0	680	441
c.d.s.t.	**Koningin Regentes**	5014	316¾	51½	21¾	7290 Y.	Amsterdam .	1900	1902	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	..	2 9·4-*in.*, 4 5·9-*in.*, 6 2·9-*in.*, 4 1·4-*in.*, 2 1.	3 2 sub.	16·5	680	444
t. & b.	**Koningin Wilhelmina der Nederlanden** . shd.	4527	327½	48¾	20	4600	Amsterdam .	1892	1894	..	..	3	..	..	11	..	1 11-*in.*, 1 8·2-*in.*, 2 6·6 *in.*, 2 6·6-*in.*, 4 2·9-*in.*, 4 1·4-*in.*, 6 1·4-*in.*, 2 M.	4	16·5	448	293
c.d.s.t.	**Kortenaer** . .	3464	282¾	47	16¾	4400	Amsterdam .	1894 1909	1896	..	6 H.S.	2	..	..	9½ H.S.	3 H.S.	3 8·2-*in.*, 2 5·9-*in.*, 6 2·9-*in.*, 8 1·4-*in.*	3	16·0	280	260
t. & b.	**Marten Tromp** .	5211	316¾	51½	21¾	6377 *t*	Amsterdam .	1904	1906	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	3 H.S.	2 9·4-*in.*, 4 5·9-*in.*, 10 2·9-*in.*, 4 1·4-*in.*	3 2 sub.	16·5 *t*	680	444
„	**Piet-Hein** . .	3464	282¾	47	16¾	4736 *t*	Rotterdam .	1894	1896	..	6 H.S.	2	..	..	9½ H.S.	3 H.S.	3 8·2-*in.*, 2 5·9-*in.*, 6 2·9-*in.*, 8 1·4-*in.*	3	16·2 *t*	280	260
„	**Reinier Claeszen** .	2440	229½	44¼	15	350	Amsterdam .	1891	1892	..	4¾–2 *comp.*	3	..	..	11 *comp.*	6 *comp. shield*	1 8·2-*in.* (*K.*), 1 6·6-*in.*, 1 2·9-*in.*, 4 1·9-*in.*, 3 1·4-*in.*	2	12·5 *t*	88	160
„	**De Zeven Provincien**	6525	339½	56	20¼	7500 Y.	Amsterdam .	1909	1910	..	6–4 K.S.	2	..	..	10 K.S.	..	2 11-*in.*, 4 5·9-*in.*, 10 12-*pr.*	..	16·0	700	440

Two coast-defence vessels of 850 tons and three monitors of 680 tons projected. Three armoured gunboats, 520 tons, oil motors, 15 knots, are to be built.

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NETHERLANDS.—Cruising Ships.

((I) denotes vessels of the Dutch Indian Navy.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	inches.	inches.			knots.	tons.	
g. v.	**Assahan (I)**	787	179	30¾	11½	1353	Rotterdam	1900	1900	..	..	..	3 *4·7-in.*, 2 *2·9-in.*, 4 *1·4-in.*	..	13·0	120	95
,,	**Borneo (I)** shd.	787	179½	31	13½	1040	Glasgow	1892	1893	..	..	..	6 *4·1-in.*, 1 *2·9-in.*, 2 *1·4-in.*, 2 M.	..	13·0	124	106
,,	**Edi (I)**	787	179½	30¾	11¾	1100	Flushing	1897	1898	..	..	..	3 *4·7-in.*, 2 *2·9-in.*, 4 *1·4-in.*	..	13·0	113	95
cr.	**Friesland**	3847	307	49	17¾	10,000 Y.	Rotterdam	1896	1898	285,700	2	..	2 *5·9-in.*, 6 *4·7-in.*, 4 *2·9-in.*, 8 *1·4-in.*, 4 smaller.	4	19·8 *t*	400	333
,,	**Gelderland**	3969	310¾	49	17¾	10,000 Y.	Feijenoord	1898	1900	..	2½	..	2 *5·9-in.*, 6 *4·7-in.*, 4 *2·9-in.*, 4 *1·4-in.*, 4 M.	4	20·0	850	333
,,	**Holland**	3847	307	49	17¾	10,000 Y.	Amsterdam	1896	1898	285,700	2	..	2 *5·9-in.*, 6 *4·7-in.*, 4 *2·9-in.*, 8 *1·4-in.*, 4 M.	4	19·6 *t*	400	333
,,	**Koetei (I)**	778	179	30¾	11½	1412	Amsterdam	1898	1899	..	..	..	3 *4·7-in.*, 2 *2·9-in.*, 4 *1·4-in.*	..	13·0	120	97
,,	**Lombok (I)** shd.	591	176	27¼	11	990	Amsterdam	1891	1892	..	..	..	3 *4·7-in.*, 1 *2·9-in.*, 2 *3-pr.*	..	12·0	55	84
,,	**Mataram (I)**	797	179½	30¾	11¾	1100	Amsterdam	1896	1897	..	..	..	3 *4·7-in.*, 2 *3-in.*, 2 *1·4-in.*	..	13·0	113	95
,,	**Noord-Brabant**	3969	310¾	49	17¾	10,000 Y.	Flushing	1899	1901	..	2½	..	2 *5·9-in.*, 6 *4·7-in.*, 4 *2·9-in.*, 4 *1·4-in.*, 4 M.	4	20·0	850	333
,,	**Serdang (I)**	797	179½	30¾	11¾	1100	Flushing	1897	1898	..	..	..	3 *4·7-in.*, 2 *2·9-in.*, 4 *1·4-in.*	..	13·0	113	95
g.v.	**Siboga (I)**	778	179	30¾	11½	1395	Amsterdam	1898	1899	..	..	..	3 *4·7-in.*, 2 *2·9-in.*, 4 *1·4-in.*	..	13·0	120	95
cr.	**Sumatra (I)**	1693	229½	37	14	3750	Amsterdam	1890	1892	..	1½	..	1 *8·2-in.*, 1 *5·9-in.*, 2 *4·7-in.*, 1 *2·9-in.*, 4 *3-pr.*, 2 M.	..	17·0	225	183
g.v.	**Sumbawa (I)**	591	176	26½	11½	930	Flushing	1891	1892	..	..	..	3 *4·7-in.*, 1 *2·9-in.*, 2 *3-pr.*	..	12·5 *t*	60	84
cr.	**Utrecht**	3969	310¾	49	17¾	10,000	Amsterdam	1898	1900	..	2½	..	2 *5·9-in.*, 6 *4·7-in.*, 4 *2·9-in.*, 4 *1·4-in.*, 4 M.	4	20·0	850	333
,,	**Zeeland**	3847	307	49	17¾	10,589 Y. *t*	Flushing	1897	1898	285,700	2	..	2 *5·9-in.*, 6 *4·7-in.*, 4 *2·9-in.*, 8 *1·4-in.*, 4 M.	4	19·4 *t*	400	333

Gun-vessels of the Indian Navy: Arend, Flamingo, Raaf, Reiger, Zeeduif, Zwaan, Pelikaan, Condor, Zeemeeuuw, Zwaluw (400 tons), launched between 1880 and 1891; Java (1279 tons), 1885; Ceram and Flores (541 tons), 1887; Glatik (417 tons), 1894; Havik, Snip, Sperwer, Kwartel, Favant, and Valk between 1894 and 1903; Argus and Cycloop (438 tons), 1893. Hydrograaf, surveying ship. Two (670 tons, 10 knots) mine-layers are to be built, and a mother ship for submarines.

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NORWAY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			in.	in.			knots.	tons.	
c.d.s.	Eidsvold .	3847	290	50½	16½	4500 Y.	Elswick	1900	1901	350,000	6 H.N.S.	2	..	..	6 H.N.S.	6 H.N.S.	2 *8·2-in.*, 6 *5·9-in.*, 8 *12-pr.*, 6 *3-pr.*	2 sub.	16·5 *t*	400 600	261
	Norge .																				
„	Harald Haarfagre .	3556	280	48½	16½	3700	Elswick	1896	1898	300,000	7 H.S.	2	..	..	8 H.S.	..	2 *8-in.*, 6 *4·7-in.*, 6 *12-pr.*, 6 *1½-pr.*	2 sub.	17·2 *t*	200 500	248
„	Torkenskjold							1897	1899												

Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
g.b.	Æger . .	387	108½	29½	8	450	Horten .	1892	1893	..	1½	..	1 *8·2-in.*, 1 *2·7-in.*, 2 *1·9-in.* . .	..	9·0	..	43
g.v.	Ellida . .	984	187	32¾	14¼	900	Horten .	1880	1881	..	..	..	5 *5·9-in. 4-ton* (K.), 1 *4·7-in.*, 1 l., 2 M. .	1	12·0	97	128
„	Frithjof . .	1349	216½	32¾	13¼	300	Horten .	1896	1898	..	..	..	2 *4·7-in.*, 4 *2·9-in.*, 4 *1·4-in.*, 2 l. . .	3 sub.	15·0	120	156
„	Heimdal . .	620	167½	26¾	11¾	700	Christiania .	1892	1893	..	..	..	4 *2·5-in.*	..	12·0	92	62
g.v.	Viking . .	1095	203½	30½	13	2000	Horten .	1891	1892	..	1½	..	2 *5·9-in.* (A.), 4 *2·5-in.*, 4 *1·4-in.*, 2 M. .	3	15·0	140	156

Eleven Gunboats, of 189 to 280 tons, and of 180 to 450 I.H.P., armed with one large gun and machine guns in each.

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PORTUGAL.—Armoured Ship.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots	tons.	
b.	**Vasco da Gama**	2972	233	40	18½	6000 W.T.	Blackwall Leghorn	1876	1878 1903	132,000	9¾–4	3	6 K.S.	..	7¾ K.S.	..	2 *8-in.*, 4 *4·7-in.*, 2 *2·5-in.*, 2 *1-pr.*, 4 M.	2 (sub.)	15·5 *t*	300	218

Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Normal Coal Supply.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr.	**Adamastor**	1962	250	35	14	4000	Leghorn	1896	1897	..	3	5	2 *5·9-in.*, 4 *4·7-in.*, 4 *2·2-in.*, 4 M.	3	18·0 *t*	270	232
cr.	**Dom Carlos I.**	4100	360	46½	17½	12,500 Y.	Elswick	1898	1899	..	4	..	4 *5·9-in.* (A.), 8 *4·7-in.*, 12 *3-pr.*, 6 *1-pr.*, 4 M.	5 (3 sub.)	22·0	1000	260
g.v.	**Dom Luiz I.**	710	151	27½	13¾	512	Lisbon	1895	1896	..	..	..	4 *4·1-in.*, 3 *2·5-in.*, 3 M.	..	9·9	100	120
g.v.	**Patria**	620	196½	27½	8½	1800	Lisbon	1903	1905	..	..	..	4 *4-in.*, 6 *1·8-in.*	..	15·0	..	..
cr	**Rainha Amelia**	1640	246	36	14¾	5000 Nor.	Lisbon	1899	1901	..	1	..	4 *5·9-in.*, 2 *3·9-in.*, 2 *3-pr.*, 4 M.	2	20·6 *t*	..	250
„	São Gabriel / São Rafael	1772	246	35½	14½	4000 N.S.	Havre	1898	1899	..	1½	..	2 *5·9-in.* (*Canet*), 4 *4·7-in.*, 8 *1·8-in.*, 2 M.	1	17·5 *t*	500	200

About 20 small gunboats, including two gunboats of 220 tons, the Al. Baptista de Andrade and Thomas Andrea, for Mozambique and Timor, 29 river-gunboats. Mine-layer, Vulcano, 110 ft. long, 19 ft. 6 in. beam, 400 I.H.P., 12 knots, launched by Thornycroft, 1909. Gunboat Macao, 107 tons, completed by Yarrow.

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RUSSIA.—Armoured Ships.

(B.S., Black Sea Fleet.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Normal Coal Supply.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkheads.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns. B.L.R. are of Russian Krupp pattern.	Torpedo Tubes.			
a.c.	**Admiral Makaroff** .	tons. 7887	ft. 443	ft. 75¾	ft. 23	19,000 B.	La Seyne .	1906	1908	£	in. 6¾–4 K.S.	in. 2	in. 3 K.S.	in. 6¾ K.S.	in. 5¾ K.S.	in. 3 K.S.	2 *8-in.*, 8 *6-in.*, 20 *12-pr.*, 4 *6-pr.*, 6 l. and M.	2 sub.	knots. 22·5 *t*	tons. 750 / 1020	573
b.	**Alexander II** . shd.	9244	326	67	23	8000	St. Petersburg.	1887	1890	..	14–6 *comp.*	2½	..	6 *comp.*	10 *comp.*	6 *comp.*	2 *12-in.*, 4 *9-in.*, 8 *6-in.*, 4 *6-pr.*, 4 *3-pr.*, 6 M.	5	16·5 *t*	1200	604
b.	**Andrei Pervozvannyi**	17,200	429¾	79¾	28½	17,600 B.	St. Petersburg. (Galerny)	1906	1910	1,170,000	11–6 K.S.	2½	5 K.S.	..	12 K.S.	7 K.S.	4 *12-in.*, 14 *8-in.*, 20 *4·7-in.*, 14 smaller	5 sub.	18·0	1500	933
a.c.	**Bayan** . . .	7887	443	75¾	23	16,500 B.	St. Petersburg (New Admiralty)	1907	1910	..	6¾–4 K.S.	2	3 K.S.	6¾ K.S.	5¾ K.S.	3 K.S.	2 *8-in.*, 8 *6-in.*, 20 *12-pr.*, 4 *6-pr.*, 6 l. and M.	2 sub.	21·0	750 / 1020	573
b.	**Cesarevitch** . .	12,912	388¾	76¼	26½	16,300 B.	La Seyne .	1901	1903	..	9¾–4 K.S.	2½	6 K.S.	9 K.S.	10–11 K.S.	6¾ K.S.	4 *12-in.*, 12 *6-in.*, 20 *3-in.*, 20 *1·8-in.*, 6 *1·4-in.*, 4 M., 2 l.	2 sub.	19·6 *t*	900 / 1350	732
t.	**Dvenadzat Apostoloff** (Twelve Apostles), B.S.	8709	330	60	26	11,500	Nicolaieff .	1890	1892	..	14–6 *comp.*	2½	10 *comp.*	12 *comp.*	12 *comp.*	5 *comp.*	4 *12-in.*, 4 *6-in.*, 8 *3-pr.*, 20 smaller Q.F. and M.	6	16·6 *t*	800	500
b.	**Evstafi** (Sviatoi), B.S. .	12,733	372¼	72¾	27	10,600 B.	Nicolaieff .	1906	1910	..	9–3 K.S.	2½	6 K.S.	7–5 K.S.	10 K.S.	5 K.S.	4 *12-in.*, 4 *8-in.*, 12 *6-in.*, 14 *3-in.*, 8 *1·8-in.*, 2 *1·4-in.*, 6 M., 2 l.	5 sub.	16	670 / 1400	731
b.	**Gangut*** . . .	23,000	590½	87	27¼	42,000 Y. tur.	St. Petersburg (New Admiralty)	Bldg.	..	..	11–4 K.S.	3	8 K.S.	4 K.S.	10 K.S.	2 K.S.	12 *12-in.*, 16 *4·7-in*, 4 *3-pr.*, 8 M.	4 sub.	23	1200 / 3000	..
b.	**Georgi Pobiedonosetz** B.S.	11,032	320	69	26½	10,600 13,468 *t*	Sebastopol .	1892	1896	‡431,000	16–11	..	12	..	12	..	6 *12-in.*, 7 *6-in.*, 8 *3·9-in.*, 12 smaller Q.F. and M.	7	16·5 *t*	700	500
a.c.	**Gromoboi** . . shd.	13,220	473	68½	26	14,500	St. Petersburg (Baltic)	1899	1900	..	6 H.S.	3	4¾ H.S.	6 H.S.	6 H.S.	4¾ H.S.	4 *8-in.*, 22 *6-in.*, 20 *3-in.*, 11 small Q.F. and M.	4 4 sub.	20·0	2500	814

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b.	**Ioann Zlatoust**, B.S.	12,733	372½	72¾	27	10,600 B.	Sebastopol	1906	..	..	9–3 K.S.	2½	6 K.S.	7–5 K.S.	12–10 K.S.	5 K.S.	4 *12-in.*, 4 *8-in.*, 12 *6-in.*, 14 *3-in.*, 8 *1·8-in.*, 2 *1·4-in.*, 6 M., 2 L.	5	16·0	670† 1400	636
a.g.b.	**Khrabry** . . .	1735	229	41⅜	11	3000 Nic.	St. Petersburg (New Admiralty)	1895	1896	..	5	1½	..	3½	..	..	2 *8-in.*, 8 Q.F. . . .	2	15·0	100	120
a.c.	**Pallada** . . .	7900	443	75⅜	23	16,500 B.	St. Petersburg (New Admiralty)	1906	1910	..	6¾–4 K.S.	2	3 K.S.	6¾ K.S.	5¾ K.S.	3 K.S.	2 *8-in.*, 8 *6-in.*, 20 *12-pr.*, 4 *6-pr.*	5 sub.	21·0	750 1020	573
b.	**Panteleimon**, B.S. (*ex* Potemkine)	12,582	372½	72¾	27	10,600 B.	Nicolaieff .	1900	1902	..	9–3 K.S.	2½	6 K.S.	7–5 K.S.	12–10 K.S.	5 K.S.	4 *12-in.*, 16 *6-in.*, 14 *3-in.*, 14 *1·4-in.*	5 sub.	17·0	670†	636
b.	**Pavel I** (Imperator) .	17,200	429¾	79¾	28½	17,600 B.	St. Petersburg (Baltic)	1907	1910	1,170,000	11–6 K.S.	2½	5 K.S.	..	12 K.S.	7 K.S.	4 *12-in.*, 14 *8-in.*, 20 *4·7-in.*, 14 smaller.	5 sub.	18·0	1500	933
b.	**Petropavlovsk.***	23,000	590½	87	27¼	42,000 Y. tur.	St. Petersburg (Baltic)	Bldg.	..	2,800,000	11–4 K.S.	3	8 K.S.	4 K.S.	10 K.S.	2 K.S.	12 *12-in.*, 16 *4·7-in.*, 4 *3-pr.*, 8 M.	4 sub.	23·0	1200 3000	...
b.	**Poltava*** . .						St. Petersburg (New Admiralty)	Bldg.	..	2,800,000											
a.c.	**Rossia** . . shd.	12,130	480	68½	26	14,500 B.	St. Petersburg	1896	1897	..	10–5 H.S.	2½	4 H.S.	6 H.S.	2 H.S.	2 H.S.	4 *8-in.*, 22 *6-in.*, 19 smaller Q.F. & M.	2	20·0	2500 §	725
b.	**Rostislav**, B.S. . .	8880	341	66½	24	8700	Nicolaieff .	1896	1900	..	15¾–8 H.S.	2-3	5 H.S.	5 H.S.	15¾ H.S.	6 H.S.	4 *10-in.*, 8 *6-in.* (Canet), 30 smaller Q.F. & M.	6	16·0	§550 800	624
a.c.	**Rurik** . . .	15,170	490	75	26	19,700 B.	Barrow . .	1906	1907	..	6–3 K.S.	1½	3 K.S.	3 K.S.	8 K.S.	7 K.S.	4 *10-in.*, 8 *8-in.*, 20 *4·7-in.*, 12 smaller.	2 sub.	21·0	1200 2000	800
b.	**Sevastopol*** . .	23,000	590½	87	27¼	42,000 Y. tur.	St. Petersburg (Baltic)	Bldg.	..	2,800,000	11–4 K.S.	2	8 K.S.	4 K.S.	10 K.S.	2 K.S.	12 *12-in.*, 16 *4·7-in.*, 4 *3-pr.*, 8 M.	4 sub.	23·0	1200 3000	...
b.	**Sinope**, B.S. . .	10,180	331	69	26½	13,000 B.	Sebastopol .	1887	1890	900,000	16–11 *comp.*	3	14 *comp.*	12	14 *comp.*	..	6 *12-in.*, 7 *6-in.*, 8 Q.F., 6 M.	7	16·75	886	325
b.	**Slava** . . .	13,516	367½	76	26	16,000 B.	St. Petersburg (Baltic)	1903	1905	..	9·4 K. S.	4	6 K.S.	9 K.S.	10 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 20 *3-in.*, 20 *3-pr.*, 6 *1-pr.*	2 sub.	18·0	1250 2000	740
b.	**Tria Sviatitelia**, B.S.	13,318	357½	72¼	27	10,600	Nicolaieff .	1893	1897	..	16 H.S.	3	16 H.S.	12 H.S.	16 H.S.	5 H.S.	4 *12-in.*, 8 *6-in.*, 4 *4·7-in.*, 50 smaller Q.F. & M.	6 2 sub.	18·0 ‡	1000	582

* Some particulars uncertain. † And liquid fuel, 580 tons. ‡ Exclusive of armament. § And liquid fuel.

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RUSSIA.—Cruising Ships, &c.

(B.S., Black Sea Fleet.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	ins.				knots.	tons.	
to.g.b.	**Abrek**	535	212¼	24¾	9	4506 *t*	Abo	1896	1897	53,600	½	..	2 *3-in.*, 4 *1·8-in.*	2	21·2 *t*	..	..
3rd cl. *cr.*	**Almaz**	3285	325	43½	17½	7500 B.	St. Petersburg (Baltic)	1903	1904	..	2¾	5–3½ K.S.	3 *4·7-in.*, 8 *1·8-in.*, 2 *1·4-in.*, 2 M.	6	19·0	560	340
2nd cl. *cr.*	**Askold**	5905	426½	49¼	20¾	24,000 T.S.	Kiel (Germania)	1900	1901	..	3	4	12 *6-in.*, 12 *3-in.*, 6 *1·8-in.*, 8 smaller Q.F. and M.	6 (2 sub.)	23·8 *t*	720 / 1100	500
2nd cl. *cr.*	**Aurora**	6731	413¼	55¾	21	11,610 B.	St. Petersburg (Galerny)	1900	1903	..	2½	..	8 *6-in.*, 20 *3-in.*, 14 smaller Q.F. and M.	3 (2 sub.)	20·0	900 / 1400	422
g.b.	**Bobr**	875	215¼	35¾	9	800	St. Petersburg (New Admiralty)	1907	1908	..	..	..	2 *4·7-in.*, 4 *12-pr.*, 3 M.	1	12·0	60	170
2nd cl. *cr.*	**Bogatyr**	6645	416¾	54½	20¾	20,300 Nor.	Stettin (Vulcan)	1901	1902	..	2	5 N.S.	12 *6-in.*, 12 *3-in.*, 6 *1·8-in.*, 8 smaller Q.F. and M.	4 (2 sub.)	24·0 *t*	720 / 1100	580
2nd cl. *cr.*	**Diana**	6630	413¼	55¾	21	11,610 B.	St. Petersburg (Galerny)	1899	1902	..	2½	..	10 *6-in.*, 20 *3-in.*, 18 smaller Q.F. and M.	3 (2 sub.)	20·0	900 / 1400	422
g.b.	**Gilyak**	875	215¼	35¾	9	800	St. Petersburg (New Admiralty)	1906	1908	..	..	..	2 *4·7-in.*, 4 *12-pr.*, 3 M.	1	12·0	60	170
to.g.b.	**Griden**, B.S.	400	192½	24¼	7½	3500	Nicolaieff	1893	1894	66,600	..	..	2 *1·8-in.*, 7 *1·4-in.*, 10 M.	2	22·0	90	60
3rd cl. *cr.*	**Jemchug**	3106	347¾	41½	16	17,000 Y.	St. Petersburg (Nevsky)	1903	1904	..	2	..	8 *4·7-in.*, 6 *1·8-in.*, 5 smaller Q.F. and M.	3	23·0	600	340
2nd cl. *cr.*	**Kagul**, B.S. (ex-Otchakoff)	6675	439	54½	20½	19,500 Nor.	Sebastopol	1902	1905	..	2¾	5–3½ K.S.	12 *6-in.*, 12 *3-in.*, 14 smaller	2 sub.	23·0	720 / 1100	570
to.g.b.	**Kazarsky**, B.S.	400	190	24	8½	3500	Elbing	1890	1891	32,500	..	..	9 *1·8-in.* (Hotchkiss)	2	23·0	90	60

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g.b.	**Koreiets**	875	215½	35½	9	800	St. Petersburg (New Admiralty)	1906	1908	..	..	..	2 *4·7-in.*, 4 *12-pr.*, 3 M.	1	12·0	60	170
to.g.b.	**Lieutenant Ilyin**	714	230	24	8½	3500	St. Petersburg	1887	1888	40,150	..	..	7 *8-pr.*, 10 M.	5	20·1 *t*	97	120
2nd cl. *cr.*	**Oleg**	6675	439½	54½	20½	19,500 Nor.	St. Petersburg (New Admiralty)	1903	1904	..	2½	5–3½ K.S.	12 *6-in.*, 12 *3-in.*, 14 smaller, Q.F., & M.	2 (sub.)	23·0	600	340
2nd cl. *cr.*	**Pamyat Mercuria**, B.S. (ex-Kagul)	6675	439	54½	20½	19,500	Nicolaieff	1903	1907	..	2½	5–3½ K.S.	12 *6-in.*, 12 *3-in.*, 14 smaller, Q.F., & M.	2 (sub.)	23·0	720	..
to.g.b.	**Posadnik**	394	192½	24½	7½	3600	Elbing	1892	1894	111,000	..	..	2 *1·8-in.*, 7 *1·4-in.*, 3 M.	2	22·0	90	87
3rd cl. *cr.*	**Rynda**	3508	265½	46	16	3000	St. Petersburg	1885	1887	..	1½	..	4 *6-in.*, 9 Q.F., M., & 4 l.	1	14·8 *t*	710	322
g.b.	**Sivoutch**	875	215½	35½	9	800	St. Petersburg. (New Admiralty)	1906	1908	..	..	..	2 *4·7-in.*, 4 *12-pr.*, 3 M.	..	12·0	60	170
corv.	**Strjelok**	1343	206½	32½	14	1528	St. Petersburg.	1880	1881	..	..	..	3 *6-in.*, 7 Q.F., M., & 4 l.	..	13·0	250	172
cr.	**Vitiaz**	6375	414	52½	20½	20,000 B.	St. Petersburg (Galerny)	Bldg.	..	..	2½	5–3½ K.S.	12 *6-in.*, 12 *3-in.*, 8 *1·8-in.*	5 (2 sub.)	23·0	720	..
to.g.b.	**Voevoda**	415	192½	24½	7½	3600	Elbing	1892	1893	111,000	..	..	2 *1·8-in.*, 7 *1·4-in.*, 3 M.	2	22·0	90	87

Okean, *coal transport*, 12,000 tons, 18 knots, launched at Kiel, 1901. Torpedo transports and mining vessels Volga, Bakan, Yenessei, Amur, Ladoga, Narova, Onega and Prut. Old gun vessels Donetz, Khivinetz, Kubanetz, Teretz, Uraletz and Zaporojetz, 1224 tons, built 1887–1904. Eight river gunboats (946 tons) for the Amur. Gunboats for the Caspian, Kars and Ardagan, launched 1909.

VOLUNTEER FLEET.—Saratoff, 8556 reg. tons. Petersburg, 9252 reg. tons, Kherson, 10,225 reg. tons, Don, 8430 reg. tons, Kuban, 8480 reg. tons, Smolensk, 11,850 reg. tons, Terek, 7241 reg. tons, all of 18½ or greater speed. Vessels of the Black Sea Shipping Company are available for transport purposes.

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SPAIN.—Armoured Ships.

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	**Alfonso XIII.**	15,460	435	78¾	25½	15,300 Y. P. tur.	Ferrol	Bldg.	..	..	9–4 K.S.	2–1	6–5 K.S.	6–3 K.S.	10 K.S.	6 K.	8 *12-in.*, 20 *4-in.*, 2 *3-pr.*, 2 l., 2 M.	..	19·5	800 / 1900	700
a.c.	**Cataluña**	6889	347¾	61	21¾	15,000	Cartagena	1900	..	600,000	12–10	2	..	12	10½	..	2 *11-in.*, 10 *5·5-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 4 *1·4-in.*, 2 M.	5 sub.	20·0	1200	484
„	**Emperador Carlos V**	9089	380	67	25	18,500	Cadiz (Vea Murguia)	1895	1898	734,000	2	6½–2	2	..	10	2	2 *11-in.* (Hontoria), 8 *5·5-in.*, 4 *3·9-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 6 M.	6	20·0	1200	535
b.	**España**	15,460	435	78¾	25½	15,300 Y. P. tur.	Ferrol	Bldg. Pro.	..	..	9–4 K.S.	2–1	6–5 K.S.	6–3 K.S.	10 K.S.	6 K.	8 *12-in.*, 20 *4-in.*, 2 *3-pr.*, 2 l., 2 M.	..	19·5	800 / 1900	700
b.	**Jaime I.**																				
b.	**Pelayo**	9744	330	66	25	9000 Nic.	La Seyne	1887	1890 1897	..	17¾	4	..	..	19½	4 H.S.	2 *12·5-in.*, 2 *11-in.*, 9 *5·5-in.*, 6 smaller, 12 M.	7	16·0	800	600
a.c.	**Princesa de Asturias**	6889	347¾	61	21¾	15,000	Carraca	1896	..	600,000	12–10	2	..	12	10½	..	2 *11-in.*, 10 *5·5-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 4 *1·4-in.*, 2 M.	5	20·0	1200	500

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SPAIN.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	ins.				knots.	tons.	
g.b.	Bonifaz	800	200	30	..	1100 Y	Cartagena	Bldg.	..	..	..	..	4 *3-in.*, 2 M.	..	13·0	..	..
to.g.b.	Don Alvaro de Bazán	810	233	26⅜	22	2500	Ferrol	1897	1899	..	..	..	2 *4·7-in.* (Hontoria), 4 *1·6-in.*, 2 M.	4	19·0	..	110
„	Doña María de Molina	810	233	26⅜	22	2500	Ferrol	1896	1898								
cr.	Extremadura	2030	290	36	14	7000 T	Cadiz	1900	1902	..	2	..	8 *4-in.* (Vickers), 4 *2·2-in.*, 2 *1·4-in.*, 1 L.	..	20·0	430	246
g.b.	Lauria	800	200	30	..	1100 Y	Cartagena	Bldg.	..	..	..	..	4 *3-in.*, 2 M.	..	13·0	..	..
„	Laya							Bldg.	..								
cr.	Lepanto	4750	318½	50½	20	12,000	Cartagena	1892	1895	..	4⅜	..	4 *7·8-in.* (Hontoria), 6 *4·7-in.*, 6 *6-pr.*, 4 *3-pr.*, 5 M.	5	20·0	1100	276
to.g.b.	Marqués de la Victoria	810	233	26⅜	22	2500	Ferrol	1897	1900	..	..	..	2 *4·7-in.* (Hontoria), 4 *1·6-in.*, 2 M.	4	19·0	..	110
g.v.	Marqués de Molíns	562	190	23	10½	2600	Ferrol	1891	1893	..	..	..	2 *4·7-in.* (Hontoria), 4 *2·2-in.*, 1 M.	2	12·0	106	80
„	Martin Alonso Pinzón							1892	1893								
g.b.	Recalde	800	200	30	..	1100 Y	Cartagena	1911	..	..	..	..	4 *3-in.*, 2 M.	..	13·0	..	..
cr.	Reina Regente	5287	337	529	19⅜	6500 W.T.	Ferrol	1906	1908	..	..	3	10 *5·5-in.*, 12 *2·2-in.*, 2 l., 8 M.	3	20·0	1200	497
„	Rio de la Plata . shd.	1773	246	35½	15	7100 N.S.	Havre	1898	1899	..	..	1	2 *5·5-in.*, 4 *3 9-in.*, 4 *2·2-in.*, 6 M.	2	20·0	270	213
g.v.	Vincente Yáñez Pinzón	562	190	23	10½	2600	Ferrol	1891	1892	..	..	..	2 *4·7-in.* (Hontoria), 4 *2·2-in.*, 1 M.	2	12·0	106	80

Hernán Cortés, Vasco Nuñez de Balboa, Ponce de Léon, MacMahon, Perla, Destructor, Nueva España and Temerario, gunboats.

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SPAIN.—Armoured Ships.

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in. K.S.	in.	in. K.S.	in. K.S.	in. K.S.	in. K.			knots.	tons.	
b.	Alfonso XIII.	15,460	435	78¾	25½	15,300 Y. P. tur.	Ferrol	Bldg.	..	..	9–4	2–1	6–5	6–3	10	6	8 *12-in.*, 20 *4-in.*, 2 *3-pr.*, 2 l., 2 M.	..	19·5	800 / 1900	700
a.c.	Cataluña	6889	347¾	61	21¾	15,000	Cartagena	1900	..	600,000	12–10	2	..	12	10½	..	2 *11-in.*, 10 *5·5-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 4 *1·4-in.*, 2 M.	5 sub.	20·0	1200	484
„	Emperador Carlos V	9089	380	67	25	18,500	Cadiz (Vea Murguia)	1895	1898	734,000	2	6½–2	2	..	10	2	2 *11-in.* (Hontoria), 8 *5·5-in.*, 4 *3·9-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 6 M.	6	20·0	1200	535
b.	España	15,460	435	78¾	25½	15,300 Y. P. tur.	Ferrol	Bldg. Pro.	..	..	9–4	2–1	6–5	6–3	10	6	8 *12-in.*, 20 *4-in.*, 2 *3-pr.*, 2 l., 2 M.	..	19·5	800 / 1900	700
b.	Jaime I.										K.S.		K.S.	K.S.	K.S.	K.					
b.	Pelayo	9744	330	66	25	9000 Nic.	La Seyne	1887	1890 1897	..	17¾	4	..	..	19½	4 H.S.	2 *12·5-in.*, 2 *11-in.*, 9 *5·5-in.*, 6 smaller, 12 M.	7	16·0	800	600
a.c.	Princesa de Asturias	6889	347¾	61	21¾	15,000	Carraca	1896	..	600,000	12–10	2	..	12	10½	..	2 *11-in.*, 10 *5·5-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 4 *1·4-in.*, 2 M.	5	20·0	1200	500

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SPAIN.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	ins.				knots.	tons.	
g.b.	Bonifaz	800	200	30	..	1100 Y	Cartagena	Bldg.	..	..	..	..	4 *3-in.*, 2 M.	..	13·0	..	..
to.g.b.	Don Alvaro de Bazán	810	233	26¾	22	2500	Ferrol	1897	1899	..	..	..	2 *4·7-in.* (Hontoria), 4 *1·6-in.*, 2 M.	4	19·0	..	110
„	Doña María de Molina	810	233	26¾	22	2500	Ferrol	1896	1898								
cr.	Extremadura	2030	290	36	14	7000 T	Cadiz	1900	1902	..	2	..	8 *4-in.* (Vickers), 4 *2·2-in.*, 2 *1·4-in.*, 1 l.	..	20·0	430	246
g.b.	Lauria	800	200	30	..	1100 Y	Cartagena	Bldg.	..	..	..	..	4 *3-in.*, 2 M.	..	13·0	..	..
„	Laya							Bldg.	..								
cr.	Lepanto	4750	318½	50½	20	12,000	Cartagena	1892	1895	..	4¾	..	4 *7·8-in.* (Hontoria), 6 *4·7-in.*, 6 *6-pr.*, 4 *3-pr.*, 5 M.	5	20·0	1100	276
to.g.b.	Marqués de la Victoria	810	233	26¾	22	2500	Ferrol	1897	1900	..	..	..	2 *4·7-in.* (Hontoria), 4 *1·6-in.*, 2 M.	4	19·0	..	110
g.v.	Marqués de Molíns	562	190	23	10½	2600	Ferrol	1891	1893	..	..	..	2 *4·7-in.* (Hontoria), 4 *2·2-in.*, 1 M.	2	12·0	106	80
„	Martin Alonso Pinzón							1892	1893								
g.b.	Recalde	800	200	30	..	1100 Y	Cartagena	1911	..	..	..	..	4 *3-in.*, 2 M.	..	13·0	..	..
cr.	Reina Regente	5287	337	529	19¾	6500 W.T.	Ferrol	1906	1908	..	..	3	10 *5·5-in.*, 12 *2·2-in.*, 2 l., 8 M.	3	20·0	1200	497
„	Rio de la Plata shd.	1773	246	35¼	15	7100 N.S.	Havre	1898	1899	..	..	1	2 *5·5-in.*, 4 *3 9-in.*, 4 *2·2-in.*, 6 M.	2	20·0	270	213
g.v.	Vincente Yáñez Pinzón	562	190	23	10½	2600	Ferrol	1891	1892	..	..	..	2 *4·7-in.* (Hontoria), 4 *2·2-in.*, 1 M.	2	12·0	106	80

Hernán Cortés, Vasco Nuñez de Balboa, Ponce de Léon, MacMahon, Perla, Destructor, Nueva España and Temerario, gunboats.

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SPAIN.—Armoured Ships.

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	**Alfonso XIII.**	15,460	435	78¾	25½	15,300 Y. P. tur.	Ferrol	Bldg.	..	..	9–4 K.S.	2–1	6–5 K.S.	6–3 K.S.	10 K.S.	6 K.	8 *12-in.*, 20 *4-in.*, 2 *3-pr.*, 2 l., 2 M.	..	19·5	800 / 1900	700
a.c.	**Cataluña**	6889	347¾	61	21¾	15,000	Cartagena	1900	..	600,000	12–10	2	..	12	10½	..	2 *11-in.*, 10 *5·5-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 4 *1·4-in.*, 2 M.	5 sub.	20·0	1200	484
„	**Emperador Carlos V**	9089	380	67	25	18,500	Cadiz (Vea Murguia)	1895	1898	734,000	2	6½–2	2	..	10	2	2 *11-in.* (Hontoria), 8 *5·5-in.*, 4 *3·9-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 6 M.	6	20·0	1200	535
b.	**España**	15,460	435	78¾	25½	15,300 Y. P. tur.	Ferrol	Bldg. Pro.	..	..	9–4 K.S.	2–1	6–5 K.S.	6–3 K.S.	10 K.S.	6 K.	8 *12-in.*, 20 *4-in.*, 2 *3-pr.*, 2 l., 2 M.	..	19·5	800 / 1900	700
b.	**Jaime I.**																				
b.	**Pelayo**	9744	330	66	25	9000 Nic.	La Seyne	1887	1890 1897	..	17¾	4	..	..	19½	4 H.S.	2 *12·5-in.*, 2 *11-in.*, 9 *5·5-in.*, 6 smaller, 12 M.	7	16·0	800	600
a.c.	**Princesa de Asturias**	6889	347¾	61	21¾	15,000	Carraca	1896	..	600,000	12–10	2	..	12	10½	..	2 *11-in.*, 10 *5·5-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 4 *1·4-in.*, 2 M.	5	20·0	1200	500

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SPAIN.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	ins.				knots.	tons.	
g.b.	Bonifaz	800	200	30	..	1100 Y	Cartagena	Bldg.	..	..	..	..	4 *3-in.*, 2 M.	..	13·0	..	..
to.g.b.	Don Alvaro de Bazán	810	233	26¾	22	2500	Ferrol	1897	1899	..	..	..	2 *4·7-in.* (Hontoria), 4 *1·6-in.*, 2 M.	4	19·0	..	110
„	Doña María de Molina	810	233	26¾	22	2500	Ferrol	1896	1898								
cr.	Extremadura	2030	290	36	14	7000 T	Cadiz	1900	1902	..	2	..	8 *4-in.* (Vickers), 4 *2·2-in.*, 2 *1·4-in.*, 1 l.	..	20·0	430	246
g.b.	Lauria	800	200	30	..	1100 Y	Cartagena	Bldg.	..	..	..	..	4 *3-in.*, 2 M.	..	13·0	..	..
„	Laya							Bldg.	..								
cr.	Lepanto	4750	318½	50½	20	12,000	Cartagena	1892	1895	..	4¾	..	4 *7·8-in.* (Hontoria), 6 *4·7-in.*, 6 *6-pr.*, 4 *3-pr.*, 5 M.	5	20·0	1100	276
to.g.b.	Marqués de la Victoria	810	233	26¾	22	2500	Ferrol	1897	1900	..	..	..	2 *4·7-in.* (Hontoria), 4 *1·6-in.*, 2 M.	4	19·0	..	110
g.v.	Marqués de Molíns	562	190	23	10½	2600	Ferrol	1891	1893	..	..	..	2 *4·7-in.* (Hontoria), 4 *2·2-in.*, 1 M.	2	12·0	106	80
„	Martin Alonso Pinzón							1892	1893								
g.b.	Recalde	800	200	30	..	1100 Y	Cartagena	1911	..	..	..	..	4 *3-in.*, 2 M.	..	13·0	..	..
cr.	Reina Regente	5287	337	529	19¾	6500 W.T.	Ferrol	1906	1908	..	..	3	10 *5·5-in.*, 12 *2·2-in.*, 2 l., 8 M.	3	20·0	1200	497
„	Rio de la Plata . shd.	1773	246	35¼	15	7100 N.S.	Havre	1898	1899	..	..	1	2 *5·5-in.*, 4 *3 9-in.*, 4 *2·2-in.*, 6 M.	2	20·0	270	213
g.v.	Vincente Yáñez Pinsón	562	190	23	10½	2600	Ferrol	1891	1892	..	..	..	2 *4·7-in.* (Hontoria), 4 *2·2-in.*, 1 M.	2	12·0	106	80

Hernán Cortés, Vasco Nuñez de Balboa, Ponce de Léon, MacMahon, Perla, Destructor, Nueva España and Temerario, gunboats.

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SPAIN.—Armoured Ships.

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	**Alfonso XIII.**	15,460	435	78¾	25½	15,300 Y. P. tur.	Ferrol	Bldg.	..	..	9–4 K.S.	2–1	6–5 K.S.	6–3 K.S.	10 K.S.	6 K.	8 *12-in.*, 20 *4-in.*, 2 *3-pr.*, 2 l., 2 M.	..	19·5	800 / 1900	700
a.c.	**Cataluña**	6889	347¾	61	21¾	15,000	Cartagena	1900	..	600,000	12–10	2	..	12	10½	..	2 *11-in.*, 10 *5·5-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 4 *1·4-in.*, 2 M.	5 sub.	20·0	1200	484
„	**Emperador Carlos V**	9089	380	67	25	18,500	Cadiz (Vea Murguia)	1895	1898	734,000	2	6½–2	2	..	10	2	2 *11-in.* (Hontoria), 8 *5·5-in.*, 4 *3·9-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 6 M.	6	20·0	1200	535
b.	**España**	15,460	435	78¾	25½	15,300 Y. P. tur.	Ferrol	Bldg. Pro.	..	..	9–4 K.S.	2–1	6–5 K.S.	6–3 K.S.	10 K.S.	6 K.	8 *12-in.*, 20 *4-in.*, 2 *3-pr.*, 2 l., 2 M.	..	19·5	800 / 1900	700
b.	**Jaime I.**																				
b.	**Pelayo**	9744	330	66	25	9000 Nic.	La Seyne	1887	1890 1897	..	17¾	4	..	..	19½	4 H.S.	2 *12·5-in.*, 2 *11-in.*, 9 *5·5-in.*, 6 smaller, 12 M.	7	16·0	800	600
a.c.	**Princesa de Asturias**	6889	347¾	61	21¾	15,000	Carraca	1896	..	600,000	12–10	2	..	12	10½	..	2 *11-in.*, 10 *5·5-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 4 *1·4-in.*, 2 M.	5	20·0	1200	500

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SPAIN.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	ins.				knots.	tons.	
g.b.	Bonifaz	800	200	30	..	1100 Y	Cartagena	Bldg.	..	..	..	..	4 *3-in.*, 2 M.	..	13·0	..	..
to.g.b.	Don Alvaro de Bazán	810	233	26¾	22	2500	Ferrol	1897	1899	..	..	..	2 *4·7-in.* (Hontoria), 4 *1·6-in.*, 2 M.	4	19·0	..	110
„	Doña María de Molina	810	233	26¾	22	2500	Ferrol	1896	1898								
cr.	Extremadura	2030	290	36	14	7000 T	Cadiz	1900	1902	..	2	..	8 *4-in.* (Vickers), 4 *2·2-in.*, 2 *1·4-in.*, 1 l.	..	20·0	430	246
g.b.	Lauria	800	200	30	..	1100 Y	Cartagena	Bldg.	..	..	..	..	4 *3-in.*, 2 M.	..	13·0	..	..
„	Laya							Bldg.	..								
cr.	Lepanto	4750	318½	50½	20	12,000	Cartagena	1892	1895	..	4¾	..	4 *7·8-in.* (Hontoria), 6 *4·7-in.*, 6 *6-pr.*, 4 *3-pr.*, 5 M.	5	20·0	1100	276
to.g.b.	Marqués de la Victoria	810	233	26¾	22	2500	Ferrol	1897	1900	..	..	..	2 *4·7-in.* (Hontoria), 4 *1·6-in.*, 2 M.	4	19·0	..	110
g.v.	Marqués de Molíns	562	190	23	10½	2600	Ferrol	1891	1893	..	..	..	2 *4·7-in.* (Hontoria), 4 *2·2-in.*, 1 M.	2	12·0	106	80
„	Martin Alonso Pinzón							1892	1893								
g.b.	Recalde	800	200	30	..	1100 Y	Cartagena	1911	..	..	..	..	4 *3-in.*, 2 M.	..	13·0	..	..
cr.	Reina Regente	5287	337	529	19¾	6500 W.T.	Ferrol	1906	1908	..	..	3	10 *5·5-in.*, 12 *2·2-in.*, 2 l., 8 M.	3	20·0	1200	497
„	Rio de la Plata shd.	1773	246	35½	15	7100 N.S.	Havre	1898	1899	..	..	1	2 *5·5-in.*, 4 *3 9-in.*, 4 *2·2-in.*, 6 M.	2	20·0	270	213
g.v.	Vincente Yáñez Pinsón	562	190	23	10½	2600	Ferrol	1891	1892	..	..	..	2 *4·7-in.* (Hontoria), 4 *2·2-in.*, 1 M.	2	12·0	106	80

Hernán Cortés, Vasco Nuñez de Balboa, Ponce de Léon, MacMahon, Perla, Destructor, Nueva España and Temerario, gunboats.

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SWEDEN.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c.d.s., t.	**Aeran** . .	3612	287	49¼	16½	6500 Y.	Gothenburg	1901	1902	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	17·2 *t*	370	250
„	**Dristigheten** .	3445	285	48½	16	5400 Y	Gothenburg	1900	1901	..	8 K.S.	1⅞	..	..	8 K.S.	3¾ K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 2 M.	2 sub.	16·5	300	250
a.c.	**Fylgia** . .	4100	377½	48¾	16	12,440 Y. *t*	Stockholm .	1905	1907	385,700	4 K.S.	2	..	..	5 K.S.	..	8 *5·9-in.*, 14 *2·2-in.*, 3 *1·4-in.* .	2	22·5 *t*	350 / 900	321
c.d.s., t.	**Göta** . .	3238	258½	48	16¾	4750	Gothenburg	1890 1902	1891	..	11¾–8	2	..	..	7½ H.S.	5 H.S.	1 *8·2-in.*, 7 *5·9-in.*, 11 *2·2-in.*, 2 *1·4-in.*	3	16·0	240	150
„	**Manligheten** .	3612	287	49¼	16½	7400 Y.	Malmö .	1904	1906	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2 2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	17·0	370	250
„	**Njord** . .	3445	278¼	48½	17½	5350	Gothenburg	1898	1899	..	9½ H.N.S.	1⅞	..	..	9⅞ H.N.S.	4 H.N.S.	2 *9·8-in.*, 6 *4·7-in.*, 10 *2·2-in.*, 4 M.	1	16·5	275	200
„	**Oden** . .	3445	278¼	48½	17½	5330	Stockholm .	1896	1898	..	9½ H.N.S.	1⅞	..	..	9⅞ H.N.S.	4 H.N.S.	2 *9·8-in.*, 4 *4·7-in.*, 10 *2·2-in.*, 4 M.	1	16·5	275	200
„	**Oscar II** . .	4203	313¾	49¼	16¾	8500 Y.	Gothenburg	1905	1907	..	6 K.S.	2	6 K.S.	6 K.S.	7½ K.S.	5 K.S.	2 *8·2-in.*, 8 *5·9-in.*, 10 *2·2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	18·0	350 / 500	326
„	**Svea** . .	3051	248¼	49¼	17	3640	Gothenburg	1886 1904	1887	..	11¾–8	2	..	..	7½ H.S.	5 H.S.	1 *8·2-in.*, 7 *5·9-in.*, 11 *2·2-in.*, 2 *1·4-in.*	1	14·7 *t*	220	268
„	**Tapperheten** .	3612	287¼	49¼	16½	6000 Y.	Malmö .	1901	1904	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	16·5	370	250
„	**Thor** . .	3445	278¼	48½	17½	5350	Stockholm .	1898	1890	..	9½ H.N.S.	1⅞	..	..	9⅞ H.N.S.	3¾ H.N.S.	2 *9·8-in.*, 6 *4·7-in.*, 10 *2·2-in.*, 4 M.	1	16·5	275	200
„	**Thule** . .	3248	260¾	48	16¾	4740	Stockholm .	1892 1904	1894	..	11¾–8	1⅞	..	..	7½ H.S.	5 H.S.	1 *8·2-in.*, 7 *5·9-in.*, 11 *2·2-in.*, 2 *1·4-in.*	2	16·2 *t*	250	165
„	**Wasa** . .	3612	287	49¼	16½	6000 Y.	Stockholm .	1901	1893	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	16·5	370	250
„	**Unnamed** . .	6800	..	..	21½	17,500 Y.	..	Pro.	..	666,000	8	..	..	..	..	..	4 *11-in.*, 4 *7·6-in.*, 11 *4·2-in.*, 4 *1-pr.*	2 sub.	22·5	800	450

The old coast-defence ships John Ericsson, Thordön, and Tirfing, 1500 tons, Loke, 1600 tons, and the armoured gunboats Berserk, Björn, Folke, Gerda, Hildur, Sölve and Ulf, 460 tons.

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SWEDEN.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.										knots.	tons.	
to.g.b.	Claes Horn . .	787	222	27	10¼	3600	Stockholm .	1899	1900	..	..	..	2 *4·7-in.*, 4 *2·2-in.* . .	1 sub.	20·0	..	100
„	Claes Uggla . .	787	232	27½	8¾	4500 Y.	Stockholm .	1900	1901	..	..	..	2 *4·7-in.*, 4 *2·2-in.* . .	1	20·5	..	100
g.v.	Edda	549	183¾	27	10¼	960	Carlskrona .	1885	1886	..	..	..	1 *10·6-in.*, 1 *6-in.*, 2 *1·5-in.*, 2 M.	..	13·6 *t*	80	76
to.g.b.	Jacob Bagge	787	222	27	10¼	3970	Malmö . .	1898	1899	..	..	..	2 *4·7-in.*, 4 *2·2-in.* . .	1 sub.	19·5	..	100
	Örnen . .					4100	Gothenburg .	1896	1897						19·5		
„	Psilander . .	787	232	27½	8¾	4500 Y.	Stockholm .	1900	1901	..	..	..	2 *4·7-in.*, 4 *2·2-in.* . .	1 sub.	20·5 *t*	..	100

Four gunboats of 190 to 200 tons, and about 130 I.H.P. each, and carrying 1 5-in. B.L.R. and 2 M.

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TURKEY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c.b.	**Assar-i-Tewfik** .	4613	272½	52½	25	3560	La Seyne .	1868	1870 1906	..	8	..	..	..	6	..	3 *5·9-in.*, 7 *4·7-in.*, 6 *6-pr.* .	..	13·0	400	..
b.	**Kheyr-ed-Din Barbarossa** * . .	9901	354½	65	24¾	9000	Wilhelmshaven	1891	1894	450,000	15¾ *comp.*	2½	..	..	11¾ *comp.*	1½	6 *11-in.*, 8 *4·1-in.*, 8 *3·4-in.*, 4 M.	3	17·0	630 1000	..
,,	**Messoudieh** . .	9120	331½	59	25¾	11,000 Nic.	Thames . Genoa	1874	1876 1901	..	12	1	12	..	6–9	12	2 *9·2-in.*, 12 *6-in.*, 14 *3-in.*, 10 *6-pr.*, 2 *3-pr.*, 2 l.	..	17·5 *t*	600	..
,,	**Turgut Reis** † . .	9901	354½	65	24¾	9000	Stettin (Vulcan)	1891	1893	450,000	15¾ *comp.*	2½	..	..	11¾ *comp.*	1½	6 *11-in.*, 8 *4·1-in.*, 8 *3·4-in.*, 4 M.	3	17·0	630 1000	..

Also the casemate ship Hamidieh, 6700 tons, launched 1885.

* Ex Kurfürst Friedrich Wilhelm. † Ex Weissenburg.

TURKEY.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr. .	**Abdul Hamid** *. . .	3800	340	47½	16	12,500 Nic.	Elswick .	1903	1904	..	4–1½	..	2 *6-in.*, 8 *4·7-in.*, 6 *1·8-in.*, 6 M.	2	22·2 *t*	600	300
to. cr. .	**Berk-i-Satvet** . . .	740	262½	27½	..	5100	Kiel . (Germania)	1906	1907	..	..	..	2 *4-in.*, 6 *6-pr.*, 2 M., 2 l. .	3	22	240	..
,, .	**Heibetnuma** . . .	1960	226	37	14	2500 ind.	Turkey .	1890	1893	..	..	..	3 *5·9-in.* (K.), 6 *4·7-in.*, 6 Q.F.	2	14·0	..	..
g.v. .	**Lutfi-Hamayoun** . .	1313	210	35	14	2800	Turkey .	1892	1894	..	..	..	4 *6-in.* (K.), 6 *4·7-in.*, 6 Q.F.	2	13·0	..	..
cr. .	**Medjidieh**	3432	331½	42	16	12,000 Nic.	Philadelphia	1903	1904	..	4–1½	..	2 *6-in.*, 8 *4·7-in.*, 6 *1·8-in.*, 6 M.	2	22·2	600	300
to. cr. .	**Peik-i-Shevket** . . .	740	262½	27½	..	5100	Kiel . (Germania)	1906	1907	..	..	..	2 *4-in.*, 6 *6-pr.*, 2 M., 2 l. .	3	22	240	..
tr. .	**Pelenk-i-deria** . . .	840	236½	31	16½	5000	Kiel . (Germania)	1890	1891	..	..	½	2 *4-in.* (K.), 16 M. . .	2	20·0	..	111

Despatch vessel Marmaris, 450 tons, launched 1907. Also the Feth-i-Bulend, 2806 tons, Avn-Illah, 2400 tons, and Mouin-i-Zaffer, 2400 tons. The North German Lloyd steamships Darmstadt, Oldenburg and Roland have been purchased as transports.

* The Abdul Hamid is receiving new Armstrong guns.

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UNITED STATES.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. *	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
t.	**Alabama.**	11,565	368	72½	26	11,207 *t*	Philadelphia	1898	1900	544,539	16½–4 H.S.	2¾–4	5½ B.S.	12 H.S.	15 H.S.	6 H.S.	4 *13-in.*, 14 *6-in.*, 16 *6-pr.*, 2 *1-pr.*, 4 M., 2 l.	..	17·0 *t*	800 / 1275	592
b.	**Arkansas**	26,000	554	93½	28½	28,000 tur.	Camden, N.J.	Bldg.	..	964,000	11–9 K.S.	..	..	8–6 K.S.	11 K.S.	8	12 *12-in.*, 21 *5-in.*, 4 *3-pr.*, 2 M., 2 l.	2 (sub.)	20·5	1650 / 2500	1115
a. c.	**Brooklyn.**	9215	400½	62	26¼	18,425 *t*	Philadelphia	1895	1896	613,583	3 H.S.	6–3	4 H.S.	..	8 H.S.	5½ H.S.	8 *8-in.*, 12 *5-in.*, 12 *6-pr.*, 4 *1-pr.*, 4 M., 2 l.	..	22·2 *t*	900 / 1622	718
,,	**California**	13,680	502	69½	24½	29,381 *t* B. & W.	S. Francisco.	1904	1907	756,000	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 (sub.)	22·2 *t*	900 / 2000	829
,,	**Charleston**	9700	424	66	25½	27,200 B.&W.	Newport News	1904	1906	563,030	4 H.S.	3	4 H.S.	..	4 H.S.	..	14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 12 *1-pr.*, 10 M., 2 l.	..	22·0	650 / 1500	664
,,	**Colorado.**	13,680	502	69½	24½	26,837 Nic.	Philadelphia	1903	1905	756,000	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 (sub.)	22·2 *t*	900 / 2000	829
t.	**Connecticut**	16,000	450	76¾	26¾	20,525 B. & W.	Camden, N.J.	1904	1906	819,300	11½ K.S.	3	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 (sub.)	18·8 *t*	900 / 2206	803
t.	**Delaware**	20,000	510	85½	27	29,025	Newport News	1909	1910	817,300	11 K.S.	..	10–8 K.S.	..	11 K.S.	5 K.S.	10 *12-in.*, 14 *5-in.*, 2 *3-pr.*, 2 l., 12 M.	2 (sub.)	21·5 *t*	1000 / 2500	927
t.	**Florida**	21,825	510	88½	27	28,000 tur.	New York	1910	..	1,280,000	11	..	10	..	11	5	10 *12-in.*, 16 *5-in.*, 4 *3-pr.*, 4 M., 2 l.	2 (sub.)	21·0	1000 / 2300	1014
Super-posed turrets.	**Georgia**	14,948	435	76½	23¾ †	25,088 *t* Nic.	Bath, Me.	1904	1906	737,700	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 (sub.)	19·2 *t*	900 / 1704	812
b.	**Idaho**	13,000	375	77	25	14,235 B. & W.	Philadelphia	1905	1908	616,360	9–4 K.S.	3–1½	7 K.S.	7 K.S.	10–7½ K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 8 *7-in.*, 12 *3-in.*, 6 *3-pr.*, 4 *1-pr.*, 8 M., 2 l.	2 (sub.)	17·2 *t*	600 / 1750	725
t.	**Illinois**	11,565	368	72½	26	12,757	Newport News	1898	1901	533,237	16½–4 H.S.	2¾–4	5½ H.S.	12 H.S.	15 H.S.	6 H.S.	4 *13-in.*, 14 *6-in.*, 16 *6-pr.*, 6 *1-pr.*, 4 M., 2 l.	..	17·45 *t*	800 / 1275	686
b.	**Indiana**	10,288	348	69½	27½	9,607 B. & W.	Philadelphia	1893	1895	620,569	18 H.S.	2¾	5 H.S.	17 H.S.	17 H.S.	10 H.S.	4 *13-in.*, 8 *8-in.*, 12 *3-in.*, 4 *6-pr.*, 2 M., 1 l.	..	15·5 *t*	400 / 1567	497

* The sums given in this column are exclusive of the cost of armour and armament according to the system of making appropriations in the estimates. † Mean draught.

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UNITED STATES.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. *	Armour. Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Armament. Guns.	Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b	**Iowa**	11,340	360	72¼	26¾	11,933	Philadelphia	1896	1897	618,514	14 H.S.	2⅝	5 H.S.	12 H.S.	15 H.S.	8–6 H.S.	4 *12-in.*, 8 *8-in.*, 10 *4-in.*, 4 *6-pr.*, 6 M., 2 l.	..	17·1 *t*	625 1795	520
t.	**Kansas**	16,000	450	77	26⅜	19,545 B. & W.	Camden, N.J.	1905	1907	855,850	8–11 K.S.	3–4½	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 (sub.)	18·1 *t*	900 2200	854
super-posed turrets	**Kearsarge** / **Kentucky**	11,540	368	72½	25¾	11,788 / 12,179	Newport News	1898	1899	462,345 each	16½–4 H.S.	2⅜–5	5½ H.S.	..	15 H.S.	9 H.S.	4 *13-in.*, 4 *8-in.*, 14 *5-in.*, 20 *6-pr.*, 8 *1-pr.*, 4 M., 2 l.	1 / ..	16·8 / 16·9 *t*	410 1591	690 / 686
t.	**Louisiana**	16,000	450	76¾	26¾	20,748 B. & W.	Newport News.	1904	1906	819,300	11–8 K.S.	3	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 L.	4	18·8 *t*	900 2200	803
,,	**Maine**	12,300	388	72½	25½	15,693 Nic.	Philadelphia	1901	1902	592,828	11–4 K.S.	2⅜–4	6 K.S.	10 K.S.	12 K.S.	6 K.S.	4 *12-in.*, 16 *6-in.*, 6 *3-in.*, 8 *3-pr.*, 6 *1-pr.*, 2 M., 2 l.	2 sub.	18·0 *t*	1000 1800	551
a.c.	**Manhattan**	8200	380½	64¾	27½	17,075	Philadelphia	1891	1893 1909	613,377	4 H.S.	2½	.. K.S.	..	6½ H.S.	5–4 H.S.	4 *8-in.*, 10 *5-in.*, 8 *12-pr.*, 4 *3-pr.*, 4 M.	..	21·0 *t*	750 1334	498
a.c.	**Maryland**	13,680	502	69½	24½	28,059 B. & W.	Newport News.	1903	1905	756,400	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	22·4 *t*	900 1850	829
b.	**Massachusetts**	10,288	348	69½	27⅓	10,240	Philadelphia	1893	1896	620,569	18 H.S.	2⅜	5 H.S.	17 H.S.	17 H.S.	10–5 H.S.	4 *13-in.*, 8 *8-in.*, 12 *3-in.*, 4 *6-pr.*, 2 M., 2 l.	..	16·2 *t*	400 1560	509
,,	**Michigan**	16,000	450	80½	24½	16,310 B. & W.	Camden, N.J.	1908	1909	700,000	11–9	3	8	10	10–8	8	8 *12-in.*, 22 *3-in.*, 2 *3-pr.*, 12 M., 2 l.	2 sub.	18·8 *t*	900 2200	669
a.c.	**Milwaukee**	9700	424	66	25½	24,166 W.T.	S. Francisco.	1904	1906	580,500	4 H.N.S.	3	4 H.N.S.	..	4 H.N.S.	..	14 *6-in.*, 18 *14-pr.*, 12 *3-pr.*, 12 *1-pr.*, 10 M., 2 l.	2 sub.	22·2 *t*	650 1500	664
t.	**Minnesota**	16,000	450	77	26¾	20,235 B. & W.	Newport News	1905	1907	844,500	8–11 K.S.	3–4½	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	18·8 *t*	900 2200	881
b.	**Mississippi**	13,000	375	77	24⅜	13,607 B. & W.	Philadelphia	1905	1908	616,360	9–4 K.S.	3–1½	7 K.S.	7 K.S.	10–7½ K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 8 *7-in.*, 12 *3-in.*, 6 *3-pr.*, 4 *1-pr.*, 8 M., 2 l.	2 sub.	17·11 *t*	600 1750	725
t.	**Missouri**	12,300	388	72½	25½	15,845 T.	Newport News	1901	1903	592,828	12–4 K.S.	2⅜–4	6 K.S.	10 K.S.	12 K.S.	6 K.S.	4 *12-in.*, 16 *6-in.*, 6 *3-in.*, 8 *3-pr.*, 4 *1-pr.*, 2 M., 2 l.	2 sub.	18·1 *t*	1000 1836	551
a.c.	**Montana**	14,500	502	72⅜	25	27,938 B & W.	Newport News	1906	1908	970,630‡	5–3 K.S.	3	5 K.S.	6 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 16 *6-in.*, 22 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 4 M., 2 l.	4 sub.	22·2 *t*	900 2000	845

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c.d.s., t.	**Monterey**	4084	256	59	15½	5244 B. & W.	S. Francisco.	1891	1893	345,731	13–6 H.S.	3	..	..	13 H.S.	..	2 *12-in.*, 2 *10-in.*, 6 *6-pr.*, 4 *1-pr.*, 2 M.	..	13·6 *t*	200	218
Super-posed turrets.	**Nebraska**	14,948	435	76¼	23¾ †	21,283 B. & W.	Seattle.	1904	1907	767,210	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	19·1 *t*	238 900 1900	812
t.	**New Hampshire**	16,000	450	77	26¾	19,100 B. & W.	Camden, N.J.	1906	1908	1,600,000 (Total)	9–4 K.S.	3	7 K.S.	7 K.S.	12 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 12 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 4 M., 2 l.	4 sub.	18·2 *t*	900 2350	916
Super-posed turrets.	**New Jersey**	14,948	435	76¼	23¾ †	23,089 B. & W.	Quincy, Mass.	1904	1906	699,680	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	19·4 *t*	900 1900	812
b.	**New York** §	27,000	..	..	..	35,000	New York	Bldg.	..	..	11–5 K.S.	3	9	..	11 K.S.	5 K.S.	10 *14-in.*, 22 *5-in.*	2 sub.	21·0	..	..
a.c.	**North Carolina**	14,500	502	72¾	25	29,785 B. & W.	Newport News	1906	1908	970,630‡	5–3 K.S.	3	5 K.S.	9 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 16 *6-in.*, 22 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 4 M., 2 l.	4 sub.	22·48 *t*	900 2000	845
b.	**North Dakota**	20,000	510	85	27	31,400 Cur. tur.	Quincy, Mass.	1908	1910	899,500	11 K.S.	..	10–8 K.S.	..	11 K.S.	5 K.S.	10 *12-in.*, 14 *5-in.*, 2 *3-pr.*, 2 l., 12 M.	2 sub.	21·6 *t*	1000 2500	960
t.	**Ohio**	12,440	388	72½	25½	16,220 T.	S. Francisco.	1901	1904	595,705	11·4 K.S.	3–4	6 K.S.	10 K.S.	12 K.S.	6 K.S.	4 *12-in.*, 16 *6-in.*, 6 *3-in.*, 8 *3-pr.*, 6 *1-pr.*, 2 M., 2 l.	2 sub.	17·8 *t*	1000 2144	521
b.	**Oregon**	10,288	348	69½	27½	11,037	S. Francisco.	1893	1896	653,447	18 H.S.	2¾	5 H.S.	17 H.S.	17 H.S.	10–5 H.S.	4 *13-in.*, 8 *8-in.*, 20 *6-pr.*, 2 *1-pr.*, 4 M.	..	16·8 *t*	400 1594	500
a.c.	**Pennsylvania**	13,680	502	69½	24½	28,600 Nic.	Philadelphia	1903	1905	799,340	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	22·4 *t*	900 2000	829
c.d.s. (2 t.)	**Puritan**	6060	290½	60	18½	3,700	Chester	1882 reblt.	1896	..	14–6 H.S.	2	..	..	14 H.S.	..	4 *12-in.*, 6 *4-in.*, 6 *6-pr.*, 2 *1-pr.*, 4 M.	..	12·4 *t*	307	230
Super-posed	**Rhode Island**	14,948	435	76¼	23¾ †	20,310 B. & W.	Quincy, Mass.	1904	1906	699,680	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	19·0 *t*	900 1900	812
a.c.	**St. Louis**	9700	424	66	25½	27,264 B. & W.	Philadelphia (Cramp)	1905	1906	563,030	4 K.S.	3	4–3	..	4 K.S.	..	14 *6-in.*, 18 *14-pr.*, 12 *3-pr.*, 12 *1-pr.*, 10 M., 2 l.	..	22·3 *t*	650 1500	664
b.	**South Carolina**	16,000	450	80¼	24½	18,357 B. & W.	Philadelphia (Cramp)	1908	1909	700,000	11–9	3	8	10	10–8	8	8 *12-in.*, 22 *3-in.*, 2 *3-pr.*, 12 M., 2 l.	2 sub.	18·9 *t*	900 2200	669
a.c.	**South Dakota**	13,680	502	69½	24½	28,598 B. & W.	S. Francisco.	1904	1907	770,570	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	22·0 *t*	900 2000	829

* See note on page 255. † Mean draught. ‡ Including armour, but not armament. § Details uncertain.

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UNITED STATES.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. *	Armour.						Armament.		Speed.	Normal Coal Supply.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.						in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	**Tennessee** .	14,500	502	72¾	25	26,963 B. & W.	Philadelphia	1904	1906	970,630‡	5–3 K.S.	3	5 K.S.	6 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 16 *6-in.*, 22 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 8 M., 2 l.	4 sub.	22·1 *t*	900 2000	858
b.	**Texas** § .	27,000	..	..	..	35,000	Newport News	Bldg.	..	1,166,000	11–5 K.S.	3	9 K.S.	..	11 K.S.	5 K.S.	10 *14-in.*, 22 *5-in.* . . .	2 sub.	21 0	..	..
b.	**Utah** . .	21,825	510	88½	28½	28,000 tur.	Camden, N.J.	1909	..	813,500	11	..	10	..	11	5	10 *12-in.*, 16 *5-in.*, 4 *3-pr.*, 4 M., 2 l.	2 sub.	21·0	1000 2300	1014
t.	**Vermont** .	16,000	450	77	26¾	17,982 B. & W.	Quincy, Mass.	1905	1907	858,730	8–11 K.S.	3–4½	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	18·33 *t*	900 2200	854
Super-posed	**Virginia** . .	14,948	435	76½	23¾ †	22,841 Nic.	Newport News	1904	1906	737,700	11–8 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	4 sub.	19·0 *t*	900 1900	812
a.c.	**Washington** .	14,500	502	72¾	27	27,152 B. & W.	Camden, N.J.	1905	1906	970,630‡	5–3 K.S.	3	5 K.S.	6 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 16 *6-in.*, 22 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 8 M., 2 l.	4 sub.	22·3 *t*	900 2000	858
,,	**West Virginia**	13,680	502	69½	24½	26,135 B. & W.	Newport News	1903	1905	798,310	6–3½ K.S.	4	5 K.S.	12 H.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	22·1 *t*	900 2000	829
t.	**Wisconsin** .	11,653	368	72¼	26	12,452	S. Francisco.	1898	1901	549,666	16½–4 H.S.	3-4	5¼ H.S.	..	15 H.S.	6 H.S.	4 *13-in.*, 14 *6-in.*, 16 *6-pr.*, 6 *1-pr.*, 4 M., 2 l.	1	17·2 *t*	800 1310	583
b.	**Wyoming** .	26,000	554	93¼	28½	28,000 tur.	Philadelphia	Bldg.	..	963,800	11–9 K.S.	..	..	8–6 K.S.	11 K.S.	8	12 *12-in.*, 21 *5-in.*, 4 *3-pr.*, 2 M., 2 l.	2 sub.	20·5	1650 2600	1115
b.	**Two Battleships** .	30,000	..	..	..	..	..	Pro.	..	2,200,000	11	..	10	..	11	5	12 *14*-in. §.	..	21·0	..	..

Also the monitors Amphitrite, Miantonomoh, Monadnock, and Terror, 3990 tons, Tonopah (*ex* Nevada), 3714 tons, Talahasse (*ex* Florida) and Ozark (*ex* Arkansas), 3235 tons, Cheyenne (*ex* Wyoming), 3218 tons, and the second-class battleship Texas, 6315 tons.

* See note on page 255. † Mean draught. ‡ Including armour, but not armament. § Details uncertain.

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UNITED STATES.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. *	Armour.		Armament.		Speed.	Normal Coal Supply.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
3rd cl. *cr.*	**Albany** . shd.	3487	345	43¾	20	7500	Elswick .	1899	1900	247,611	3	3–1½ shields	10 *6-in.*, 10 *3-pr.*, 12 *1-pr.*, 2 M., 1 l.	..	20·5 *t*	512 / 747	356
cr. .	**Bennington** . .	1710	230	36	16½	3392	Chester .	1890	1891	100,894	½	..	6 *6-in.*, 4 *6-pr.*, 4 *1-pr.*, 4 M.	..	17·5 *t*	200 / 403	195
scout .	**Birmingham** .	3750	420	46¾	17	15,670 Express	Quincy, Mass.	1907	1908	301,000	2–1½	..	2 *6-in.*, 6 *3-in.* . . .	2 sub.	24·3 *t*	1250	356
cr. .	**Boston** . . .	3000	271½	42¼	20½	4030	Chester .	1884	1887	127,196	1½	..	2 *8-in.*, 6 *6-in.*, 6 *6-pr.*, 4 *1-pr.*, 2 M., 1 l.	..	15·6 *t*	380 / 456	282
g.v. .	**Castine** . .	1177	204	32	14¼	2199	Bath, Me. .	1892	1894	65,450	½	..	8 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 1 M.	..	16·0	125 / 292	151
cr. .	**Chattanooga** shd..	3200	292	44	16¾	5303 B.&W.	Elizabeth Port	1903	1904	212,325	2	..	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·65 *t*	470 / 700	302
scout .	**Chester** . .	3750	420	46¾	17	16,000 Nor. turb.	Bath, Me. .	1907	1908	337,000	2–1½	..	2 *5-in.*, 6 *3-in.* . . .	2 sub.	26·5 *t*	1250	356
3rd cl. *cr.*	**Chicago** . .	4500	325	48¼	22½	9000 C. & B.&W.	Chester .	1885	1888	182,677	1½	4 shield	4 *8-in.*, 14 *5-in.*, 9 *6-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	18·0	831	409
,, ,,	**Cincinnati** . .	3213	300	42	20¼	8,490 B.&W.	Brooklyn .	1892	1894	226,055	2½	4	11 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 2 M.	..	19·0	350 / 468	314
cr. .	**Cleveland** . shd..	3200	292	44	16¾	4640 B.&W.	Bath, Me. .	1901	1903	212,325	2	..	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·4 *t*	470 / 700	302
2nd cl. *cr.*	**Columbia** . .	7375	412	58½	25½	18,509	Philadelphia	1892	1894	559,950	4–2½	4 shield	1 *8-in.*, 2 *6-in.*, 8 *4-in.*, 12 *6-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	22·8 *t*	750 / 1670	477
g v. .	**Concord** . .	1710	230	36	16½	3404	Chester .	1890	1891	100,894	½	..	6 *6-in.*, 2 *6-pr.*, 2 *3-pr.*, 2 *1-pr.*	..	16·8 *t*	200 / 401	194
3rd cl. *cr.*	**Denver** . shd.	3200	292	44	16¾	4135 B. & W.	Philadelphia	1902	1904	212,325	2	..	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·75	470 / 700	303
,,	**Des Moines**						Quincy, Mass.										

* Prices exclusive of armament.

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UNITED STATES.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. *	Armour.		Armament.		Speed.	Normal Coal Supply.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
3rd cl.*cr.*	Detroit	2089	257	37	16¾	5207	..	1891	1892	..	..	..	10 *5-in.*, 6 *6-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	18	200/340	248
,,	Dubuque	1085	174	35	13	1193 B. & W.	Morris Heights, N.Y.	1904	1905	..	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 2 M.	..	12·9	200	162
cr.	Galveston . shd.	3200	292	44	16¾	5073 B. & W.	Richmond, Va.	1903	1904	212,325	2	..	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·4	470/700	302
g.v.	Helena	1392	250¾	40	10	1988	Newport News	1896	1897	57,536	½	2½	8 *4-in.*, 4 *6-pr.*, 4 *1-pr.*, 2 M.	..	15·5 *t*	106/300	256
3rd cl.*cr.*	Marblehead	2089	257	37	16¾	5450	Boston	1892	1894	138,498	½	..	10 *5-in.*, 6 *6-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	18·9 *t*	200/340	248
g.b.	Marietta	1000	174	34	13½	1054 B.&W.	S. Francisco.	1896	1897	45,823	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 1 M.	..	13·2 *t*	100/239	140
2nd cl.*cr.*	Minneapolis	7375	412	58¼	25½	20,862	Philadelphia.	1893	1894	552,754	4–2½	4 shield	1 *8-in.*, 2 *6-in.*, 8 *4-in.*, 12 *6-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	23·0 *t*	750/1200	477
to. cr.	Montgomery	2089	257	37	17	5584	Baltimore	1891	1894	125,860	½	..	4 *6-pr.*	6 (2 sub.)	18·8 *t*	200/340	257
g.v.	Nashville	1371	220	38	12	2536 C. & Y.	Newport News	1895	1897	57,536	½	..	8 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 2 M.	..	16·7 *t*	150/400	176

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3rd cl. *cr.*	**New Orleans**	shd.	3487	346	43¾	19¾	7500	Elswick	1896	1898	293,684	..	3–1¼ shields	10 *5-in.*, 10 *3-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	20·0	512 767	366
2nd cl. *cr.*	**Olympia**		5870	340	53	24¾	17,313	S. Francisco.	1892	1895	369,054	4½	4–2½	4 *8-in.*, 10 *5-in.*, 14 *6-pr.*, 4 *1-pr.*, 2 M.	..	21·69 *t*	400 1169	450
g.v.	**Paducah**		1085	174	35	13	1000 B.&W.	Morris Heights, N.Y.	1904	1905	..	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 2 M.	..	12·0	200	162
g.b.	**Princeton**		1000	168	36	12½	923	Camden	1897	1898	47,262	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 1 M.	..	12·0	100 238	135
3rd cl. *cr*	**Raleigh**		3213	300	42	20¼	8500 B.&W.	Norfolk	1892	1894	226,055	2½	4	11 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 2 M., 1 l.	..	19·0	350 460	313
scout	**Salem**		3750	420	46¾	18¼	22,242 W.T. turb.	Quincy, Mass.	1907	1908	301,000	2–1½	..	2 *5-in.*, 6 *3-in.*	2 sub.	25·9 *t*	1250	356
3rd cl. *cr.*	**Tacoma**	shd.	3200	292	44	16¾	5288 B.&W.	S. Francisco.	1903	1904	212,325	..	2 shields	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·6 *t*	470 700	302
g.v.	**Vicksburg**		1000	168	36	12½	1118	Bath, Me.	1896	1898	47,406	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 1 M.	..	12·7 *t*	100 239	135
„	**Wheeling**		1000	174	34	12½	1080	S. Francisco.	1897	1897	65,540	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 1 M.	..	12·9 *t*	120 226	140
„	**Wilmington**		1392	250¾	40	10	1894	Newport News	1895	1897	57,536	1	2¼	8 *4-in.*, 4 *6-pr.*, 4 *1-pr.*, 4 M.	..	15·0 *t*	100 300	175
cr.	**Yorktown**		1710	230	36	16½	3392	Philadelphia	1888	1889	93,496	..	..	6 *6-in.*, 2 *6-pr.*, 2 *3-pr.*, 4 *1-pr.*, 2 M.	2	16·1 *t*	200 380	195

Third class cruisers Baltimore, Atalanta, Newark, and San Francisco, the last named converted into a mine-layer. Colliers Prometheus and Vestal (12,585 tons).

The Buffalo, Panther, Dixie, and Prairie are converted merchant vessels (3380 to 6625 tons), built 1889–93, armed with 6-in. and smaller guns.

The ocean liners St. Louis and St. Paul, 11,629 tons, New York and Philadelphia, 10,802 tons, 20 knots (International Navigation Co.), and the Korea and Siberia, 11,200 tons, 18 knots (Pacific Mail Steamship Co.) are enrolled auxiliary cruisers of the United States Navy.

* Prices exclusive of armament.

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SHIPS BELONGING TO POWERS WHOSE NAVIES ARE OF LESSER IMPORTANCE.

Bulgaria.—Eleven steamers of small size, of which one is used as the Prince's yacht. Two armoured gunboats for the Danube built at Leghorn. The Nadiezda, despatch vessel (715 tons), launched Bordeaux, 1898; 18·85 knots; 2600 I.H.P.; Lagrafel-d'Allest boilers; armament, 2 3·9-in., 3 1·8-in. Q.F., and 2 torpedo tubes. Three 100-ton 26-knot torpedo boats launched 1907; three smaller.

Colombia.—The cruiser Almirante Lezo (*ex* El Baschir), of 1200 tons displacement; 2500 H.P.; 18 knots; built 1892, bought from Morocco, 1902. Two gunboats, Chercuito, 643 tons, and Bogota. Two river gunboats, General Nerino and Esperanza, 400 tons.

Cuba.—Messrs. Cramp are building a cruiser (Cuba), 2055 tons, 3500 H.P., 18 knots, and a gunboat (Patria), 1200 tons, 1500 H.P., 16 knots.

Ecuador.—The torpedo cruiser Almirante Simpson, 812 tons, has been bought from Chili. One torpedo boat and two steam transport vessels.

Egypt.—The Nile stern-wheel gunboats Sultan, Sheikh and Melik, 140 tons, Fateh and Naseh, 128 tons; also the Abu Klea, Hafir, Metemmeh, and Tamai.

Hayti.—Steel gunboat—Capois la Mort, 260 tons, 1 3·9-in., and 4 1-pr. Q.F. Iron corvette—Dessalines, 1200 tons, armed with 1 3·9-in. Q.F., 2 3·9-in. B.L., 2 l., 2 M. Two sloops—St. Michael and 1804. Gun-vessel, 22nd of December.

Mexico.—Two gun-vessels, Tampico and Vera Cruz, launched Elizabethport, New Jersey, 1902; displacement, 980 tons; armament, 4 4-in. Q.F., 6 6-pr.; bow torpedo tube; 2400 I.H.P.; speed, 16 knots; fitted to serve as transport for 200 troops. Gun vessels Bravo and Morero, 1200 tons; 2600 I.H.P.; Blechynden boilers; 17 knots; launched Leghorn, 1904. The Zaragoza, 1200 tons, 1300 H.P., 15 knots speed, and armed with 4 4·7-in. guns and 4 small quick-firing guns. Gun-vessel, Democrata, 450 tons; 11 knots; 2 6½-in. muzzle-loaders and 2 small guns. Torpedo transport General Guerrero, 1880 tons; 1200 I.H.P.; completed at Barrow 1908. Two small gunboats of 10 knots speed. Five torpedo boats.

Peru.—Almirante Grau, cruiser, 3200 tons; 370 ft. long, 40 ft. 6 in. beam, 14 ft. 3 in. draught; launched at Barrow, March, 1906; 2 6-in., 8 14-pr., 8 1¼-pr.; 2 submerged torpedo tubes; 1½-in.

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armoured deck, 3-in. conning tower; 14,000 I.H.P.; 24 knots. At sister vessel is in hand at the same yard. Eclaireur, cruiser, 1769 tons, launched 1877, partially reconstructed; bought from France. Lima, of 1700 tons, 1800 I.H.P., 16 knots; armament, 2 6-in. B.L.R. guns. Screw steamer, Santa Rosa, about 400 tons.

Roumania.—Elizabeta, protected cruiser (deck 3 in.), built in 1887 at Elswick; 230 ft. long, 32 ft. 10 in. beam; 1320 tons; 3000 I.H.P.; armament, 4 5·9-in. B.L.R., 4 Q.F., 2 M., 4 torpedo tubes. Composite gunboat Mircea, 360 tons; Grivitza, 110 tons. Two gunboats of 45 tons, and 3 first-class torpedo boats, these forming the sea division. For the Danube, the gunboats Fulgurul, Oltul, Siretul, Bistritza, 90 to 100 tons, the *torpilleur de barrage* Alexandru cel Bun (104 tons), 5 sloops, 2 small torpedo boats, and the paddle steamer Romania, 240 tons, repaired 1890. The shipbuilding programme includes 8 monitors of 600 tons, 12 torpedo boats and 8 vedettes for the Danube, and 6 coast-defence vessels of 3500 tons, 4 destroyers of 300 tons, and 12 torpedo boats for the Black Sea. Four monitors (3 4·7-in. guns) and 3 torpedo boats completed.

Santo Domingo.—The Independencia, built in England 1894, 170 ft. long, 25 ft. broad, displacement 322 tons, and armed with seven Hotchkiss quick-firing guns. Restauracion, steel gunvessel, 1000 tons, launched at Glasgow in 1896. The 14-knot cruiser Presidente has been reconstructed, and carries seven guns.

Sarawak.—Two gunboats, of 175 and 118 tons respectively, of low speed, each armed with two guns.

Siam.—Deck-protected cruiser, Maha Chakrkri, 290 ft. long, 39 ft. 4 in. beam, of 2500 tons displacement and 17 to 18 knots speed; armament, four 4·7-in. quick-firing guns, and ten 6-pr. quick-firing guns. Makut-Rajakamar, 650 tons. The gunboats Bali, Muratha, and Sugrib, 600 tons, one 4·7-in. Q.F., five 2·2 in., four 1·4 in., 12 knots, launched 1898 and 1901. Several other gunboats. Three modern despatch vessels 100 to 250 tons. One 380-ton, 27-knot destroyer built, and two others building in Japan.

Uruguay.—Gunboats: General Artigas, 274 tons, 12½ knots speed, 2 4·7-in. (Krupp), 2 M.; and General Saurez, 300 tons. The Italian cruiser Dogali has been purchased. The cruiser Uruguay, built at the Vulcan Yard, Stettin; 1100 tons; 2 4·7-in., 4 12-pr., 12 Maxims; 2 18-in. torpedo tubes; 5700 I.H.P.; 23 knots.

Venezuela.—The gunboats Bolivar (571 tons, 18·6 knots) and Miranda (200 tons, 12 knots); transports Restaurador (568 tons), and Zamora (350 tons).

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BRITISH AND FOREIGN TORPEDO-BOAT FLOTILLAS.

Great Britain.

Name or Number.	Built by.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
Great Britain. TORPEDO-BOAT DESTROYERS.			Feet	Feet.	Feet.		Tons.		Knots.				Tons
Banshee .. .. ..*	Laird	1894	210	19·5	..	2	290	4,400	27·97	1-12 pr. 3-6 prs.	2	50	60
†Boxer	Thornycroft ..	1894	201·6	19	7·3	2	265	4,500	29·17	1-12 pr. 5-6 prs.	2	45	60
†Bruizer	,, ..	1895	201·6	19	7·3	2	265	4,500	27·97	1-12 pr. 5-6 prs.	1	45	60
*Charger	Yarrow..	1894	190	18·5	5·25	2	270	3,100	27·98	1-12 pr. 5-6 prs.	2	45	60
Conflict	White	1894	205·6	20	..	2	320	4,370	27·21	1-12 pr. 5-6 prs.	2	50	60
†Daring	Thornycroft ..	1893	185	19	7	2	260	4,300	27·70	1-12 pr. 3-6 prs.	1	45	50
*Dasher	Yarrow..	1894	190	18·5	5·25	2	255	3,182	26·21	1-12 pr. 5-6 prs.	2	45	60
Dragon	Laird	1894	210	19·5	..	2	290	4,500	27·14	1-12 pr. 3-6 prs.	1	50	60
Fervent	Hanna	1895	200	19	7·8	2	275	3,800	[27]	1-12 pr. 5-6 prs.	1	50	70
†Handy	Fairfield	1895	200	19	7·8	2	275	3,800	27·04	1-12 pr. 5-6 prs.	1	50	70
†Hart..	Fairfield	1895	185	19	7	2	275	4,010	27·07	1-12 pr. 5-6 prs.	1	50	70
*Hasty	Yarrow..	1894	190	18·5	5·25	2	270	3,250	26·08	1-12 pr. 5-6 prs.	2	45	60
Haughty..	Doxford	1895	196	19	5	2	260	4,000	27·1	1-12 pr. 5-6 prs.	2	50	60
Havock	Yarrow..	1893	180	18·5	5·25	2	240	3,500	26·77	1-12 pr. 3-6 prs.	1	43	57
†Hunter	Fairfield	1895	200	19·7	6·5	2	275	4,000	27·2	1-12 pr. 5-6 prs.	1	45	60
Janus	Palmer	1895	200	19·7	6·5	2	275	3,789	27·8	1-12 pr. 5-6 prs.	2	50	60
Lightning	,, ...	1895	200	19·7	6·5	2	275	4,007	27·94	1-12 pr. 5-6 prs.	2	50	60
Lynx	Laird	1894	194	19·25	5	2	280	4,000	27·00	1-12 pr. 3-6 prs.	1	50	70
‡Opossum	Hawthorn	1895	200	19	5·2	2	295	4,052	28·24	1-12 pr. 5-6 prs.	1	50	60
Porcupine	Palmer	1895	200	19·7	6·5	2	275	3,866	27·91	1-12 pr. 5-6 prs.	2	50	60
‡Ranger	Hawthorn	1895	200	19	5·2	2	295	3,900	27·13	1-12 pr. 5-6 prs.	1	50	60
Rocket	Brown & Co. ..	1894	205·6	19·5	5·25	2	280	4,200	27·37	1-12 pr 5-6 prs.	2	50	60
Salmon	Earle's Co.	1895	200	19·5	5·4	2	305	3,580	27·60	1-12 pr 5-6 prs.	2	50	60
Shark	Thomson	1894	205·6	19·5	5·25	2	280	4,250	27·59	1-12 pr 5 6 prs.	2	50	60
Snapper	Earle's Co.	1895	200	19·5	5·5	2	305	4,500	27·9	1-12 pr. 5-6 prs.	2	50	60
Spitfire	Armstrong	1895	200	19	5·3	2	295	3,780	27·5	1-12 pr. 5-6 prs.	1	45	60
‡Sunfish	Hawthorn	1895	200	19	5·2	2	295	4,292	27·62	1-12 pr. 5-6 prs.	1	50	60
Surly	Thomson	1894	205·6	19·5	5·25	2	280	4,400	28·05	1-12 pr. 5-6 prs.	2	50	50
Teazer	White	1895	200	19·5	5·6	2	320	4,500	[27]	1-12 pr. 5-6 prs.	2	50	60
Wizard	,, ...	1895	200	19·5	5·2	2	320	4,400	[27]	1-12 pr. 5-6 prs.	2	45	60
Zebra	Thames Ironworks	1895	200	20	6	2	310	3,850	27·00	1-12 pr. 5-6 prs.	2	50	60
Zephyr	Hanna	1895	200	19	5·3	2	275	3,850	[27]	1-12 pr. 5-6 prs.	1	50	60
†Albatross	Thornycroft ..	1898	227·6	21·25	8·5	2	430	7,900	31·5	1-12 pr. 5-6 prs.	2	68	100
†Angler	,, ..	1897	210	19·6	7·1	2	310	5,800	30·37	1-12 pr. 5-6 prs.	2	60	80
Arab	Brown & Co. ..	1901	218	20·0	5·6	2	470	6,000	31	1-12 pr. 5-6 prs.	2	60	80
†Avon	Vickers	1896	210·6	21·6	5·6	2	355	6,000	30	1-12 pr. 5-6 prs.	2	60	80
Bat	Palmer	1896	215	20·75	6·8	2	360	6,185	30·1	1-12 pr. 5-6 prs.	2	60	91
†Bittern	Vickers	1897	210·6	21·6	5·6	2	355	6,000	30	1-12 pr. 5-6 prs.	2	60	80
Brazen	Brown & Co. ..	1896	218	20·0	5·6	2	315	6,000	30	1-12 pr. 5-6 prs.	2	60	80
†Bullfinch..	Earle's Co.	1898	210	20·6	5·8	2	345	5,800	30	1-12 pr. 5-6 prs.	2	60	80
†Cheerful	Hawthorn	1897	210	21·0	8	2	355	6,000	30	1-12 pr. 5-6 prs.	2	62	82
†Coquette	Thornycroft ..	1897	210	19·5	7·2	2	335	5,800	30·21	1-12 pr. 5-6 prs.	2	60	80
Crane	Palmer	1896	215	20·7	6·8	2	360	6,336	30·3	1-12 pr. 5-6 prs.	2	60	80
†Cygnet	Thornycroft ..	1898	210	19·5	7·2	2	335·	5,800	30·3	1-12 pr. 5-6 prs.	2	60	80
†Cynthia	,, ..	1898	210	19·5	7·2	2	355	5,800	30·2	1-12 pr. 5-6 prs.	2	60	80
†Desperate	,, ..	1896	210	19·6	7·2	2	310	5,800	30	1-12 pr. 5-6 prs.	2	60	80
†Dove	Earle's Co.	1898	210·0	20·6	5·8	2	345	5,800	30	1-12 pr. 5-6 prs.	2	60	80
Earnest	Laird	1896	210·6	21·7	5·3	2	355	6,000	30·13	1-12 pr. 5-6 prs.	2	58	80
Electra	Brown & Co. ..	1896	218	20·0	5·6	2	3 0	6,000	30	1-12 pr. 5-6 prs.	2	58	80
Express	Laird	1897	227 6	22·0	9	2	465	9,000	31	1-12 pr. 5-6 prs.	2	60	80
Fairy	Fairfield	1897	227·6	22·0	9	2	355	6,000	30	1-12 pr. 5-6 prs.	2	60	80
†Falcon	,, ..	1899	220·	21·3	9	2	375	6,000	30	1-12 pr. 5-6 prs.	2	60	80
†Fame	Thornycroft ..	1896	210·6	19·6	7·1	2	310	5,800	30·16	1-12 pr. 5 6 prs.	2	60	80
Fawn	Palmer	1897	215	20·7	6·8	2	360	6,581	30·5	1-12 pr 5-6 prs.	2	60	91
Flirt..	,, ...	1897	215	20·7	6·8	2	360	6,682	30	1-12 pr. 5-6 prs.	2	60	91
Flying Fish	,, ...	1897	215	20·7	6·8	2	360	6,416	30·4	1-12 pr. 5-6 prs.	2	58	91
†Foam	Thornycroft ..	1896	210	19·6	7·1	2	310	5,800	30·18	1-12 pr. 5-6 prs.	2	58	80
Gipsy	Fairfield	1897	227·6	22·0	9	2	355	6,000	30	1-12 pr. 5-6 prs.	2	60	80
Greyhound	Hawthorn	1900	210	21	8·6	2	385	6,000	30	1-12 pr. 5-6 prs.	2	60	90
Griffon	Laird	1896	210·0	20	5·3	2	355	6,000	30·11	1-12 pr. 5-6 prs.	2	58	80
Kestrel	Brown & Co. ..	1898	218	20·0	5·6	2	350	6,000	30	1-12 pr. 5-6 prs.	2	60	80
Kangaroo..	Palmer	1900	215	20·75	6·8	2	370	6,500	30	1-12 pr. 5-6 prs.	2	60	91
Leopard	Vickers	1897	210	20·0	5·6	2	350	6,000	30	1-12 pr. 5-6 prs.	2	60	80

* Built by Yarrow, fitted with Thornycroft W.T. boilers at Earle's. All Jarrow-built destroyers have Reed's boilers. Vessels marked † have Thornycroft W.T. boilers.

· Incorrectly credited to Palmers in Dilke Return 1900.

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Great Britain—*continued.*

Name or Number.	Built by.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
TORPEDO-BOAT DESTROYERS.			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Leven	Fairfield	1898	218 0	20.0	5·6	2	370	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Lively	Laird	1900	218	20·0	5·6	2	385	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Locust	,,	1896	210	21·7	5·3	2	355	6,000	30·16	1–12 pr. 5–6 prs.	2	58	80
†Mallard	Thornycroft	1896	210·6	19·6	7·1	2	310	5,800	30·11	1–12 pr. 5–6 prs.	2	60	80
Mermaid	Hawthorn	1898	210	21 0	8	2	355	6,000	30	1–12 pr. 5–6 prs.	2	60	82
Myrmidon	Palmer	1900	215	20·75	6·8	2	370	6,500	30	1–12 pr. 5–6 prs.	2	62	91
Orwell	Laird	1898	218 0	20·0	5·6	2	360	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Osprey	Fairfield	1897	227·6	22·0	9	2	355	6,000	30	1–12 pr. 5–6 prs.	2	60	80
†Ostrich	,,	1900	210	21·0	9	2	375	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Otter	Vickers	1896	210	20·0	5·6	2	350	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Panther	Laird	1897	210·6	21·7	5·3	2	355	6,000	30·14	1–12 pr. 5–6 prs.	2	58	80
Peterel	Palmer	1899	215	20·8	..	2	370	6,200	30	1 12 pr. 5–6 prs.	2	62	85
Quail	Laird	1895	213·6	21·6	5·3	2	355	6,000	30·38	1–12 pr. 5–6 prs.	2	58	90
Racehorse	Hawthorn	1900	210	21	8·6	2	385	6,000	30	1–12 pr. 5–6 prs.	2	60	90
Recruit	Brown & Co.	1896	218·0	20·0	5·6	2	350	6,900	30	1–12 pr. 5–6 prs.	2	58	90
Roebuck	Hawthorn	1901	210	21	8·6	2	385	6,000	30	1–12 pr. 5–6 prs.	2	60	90
Seal	Laird	1897	218·0	20·0	5·6	2	355	6,000	30·15	1–12 pr. 5–6 prs.	2	58	80
Spiteful	Palmer	1899	215	20·75	6·8	2	365	6,500	30·1	1–12 pr. 5–6 prs.	2	62	91
Sprightly	Laird	1900	218	20·0	5·6	2	385	6,000	30	1–12 pr. 5–6 prs.	2	58	80
†Stag	Thornycroft	1900	210	19·75	7·2	2	320	5,800	30 34	1–12 pr. 5–6 prs.	2	60	80
Star	Palmer	1896	215	20·75	6·88	2	360	6,266	30·7	1–12 pr. 5–6 prs.	2	58	91
Success	Doxford	1901	210·0	21·0	9·2½	2	380	6,000	30	1–12 pr. 5–6 prs.	2	62	43
†Sylvia	,,	1897	210	19·9	7·6	2	350	5,400	30	1–12 pr. 5–6 prs.	2	58	80
Syren	Palmer	1900	215	20·75	6·8	2	390	6,500	30	1–12 pr. 5–6 prs.	2	..	91
Taku	Schichau	1898	193 6	20	5	2	305	6,500	32	6–3 pr. Q.	3	..	67
Thorn	Brown & Co.	1900	210	21	5·5	2	380	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Thrasher	Laird	1895	210·6	21·7	5·3	2	355	6,000	30·13	1–12 pr. 5–6 prs.	2	58	80
Vigilant	Brown & Co.	1900	210	21	5·5	2	380	6,000	30	1–12 pr. 5–6 prs.	2	58	80
†Violet	Doxford	1897	210	20·75	6·88	2	350	5,400	30	1–12 pr. 5–6 prs.	2	58	80
Virago	Laird	1895	210·6	21·7	5·3	2	355	6,000	30·13	1–12 pr. 5–6 prs.	2	58	80
aVixen	Vickers	1900	210·0	20·0	5·8	2	400	6,000	30	1–12 pr. 5–6 prs.	2	62	88
Vulture	Brown & Co	1898	218	20	5·6	2	345	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Whiting	Palmer	1896	215	20·75	6·88	2	360	6,239	30·2	1–12 pr. 5 6 prs.	2	58	91
Wolf	Laird	1897	218	20	5·6	2	355	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Derwent	Hawthorn	1904	220	23	10	2	534	7,000	25·68		2	70	130
‡Eden	,,	1903	220	23	8¼	6	527	7,000	26·22		2	70	130
Exe	Palmer	,,	225	23¼	10	2	540	7,000	25·64		2	70	127
Ribble	Yarrow	1904	225	23¼	10	2	550	7,500	26		2	70	120
Itchen	Laird	1903	225	23¼	10	2	550	7,000	25·64		2	70	130
Usk	Yarrow	,,	225	23¼	10	2	550	7,500	26		2	70	120
Teviot	Yarrow	,,	225	23¼	10	2	550	7,500	26		2	70	120
Ettrick	Palmer	,,	225	23¼	10	2	540	7,000	25·56	4–12 prs.	2	70	127
Foyle	Laird	,,	225	23¼	10	2	550	7,000	25·65		2	70	120
Erne	Palmer	,,	225	23¼	10	2	540	7,000	25·6		2	70	127
Arun	Laird	,,	225	23¼	10	2	550	7,000	25·72		2	70	130
Cherwell	Palmer	,,	225	23¼	10	2	540	7,000	25·6		2	70	127
Dee	Palmer	,,	225	23¼	10	2	540	7,000	25·5		2	70	127
Jed	Thornycroft	1904	222	23¼	9·6	2	640	7,500	25·78		2	70	126
Kennet	,,	1903	222	23¼	9·6	2	640	7,500	25·99		2	70	126
‡Velox	Parsons	1902	210	23	8¼	8	440	8,000	27	1–12 pr. 5–6 prs.	2	63	130
Waveney	Hawthorn	1903	220	23¼	10	2	534	7,000	25 62	4–12 prs.	2	70	130
Welland	Yarrow	1904	225	23¼	10	2	550	7,500	26		2	70	120
Chelmer	Thornycroft	1904							25·7				
Boyne	Hawthorn	1904							25·72				
Colne	Thornycroft	1905							25·57				
Doon	Hawthorn	1904							25·8				
Garry	Yarrow	1905							26·5				
Kale	Hawthorn	1904							25·74				
Rother	Palmer	1904							25·51				
Liffey	Laird	1904	222	23¼	9·6	2	600	7,500	25·51	4–12 prs.	2	72	95 / 126
Moy	,,	1904							25 6				
Ness	White	1905							25·62				
Nith	,,	1905							25·69				
Ouse	Laird	1905							25·56				
Swale	Palmer	1905							25·59				
Ure	Palmer	1904							25 65				
Wear	Palmer	1905							25 62				

† Have Thornycroft W.T. boilers.

‡ Hulls and Yarrow boilers of these vessels by Hawthorn Leslie & Co.

a Has four Express W.T. boilers.

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Great Britain—*continued.*

Name or Number.	Built by.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal or Oil.
OCEAN-GOING DESTROYERS.			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
‡*Afridi	Armstrong	1907	250	25	8·5	3	855	14,250	32·75	3–12-prs.	2	60	92½*c*
‡*Cossack	Cammell Laird	1907	270	26	9·3	3	890	14,000	33·15				78
‡*Ghurka	Hawthorn	1907	255	25·7	9·3	3	880	14,250	34				98
¶‡*Mohawk	White	1907	270	25	8·10	3	865	14,500	34·51				74
‡*Tartar	Thornycroft	1907	270	26	9·1	3	872	14,500	35·67	3–12 prs.	2	68	76
¶‡*Saracen	White	1908	272	26	9·5	3	980	15,500	33·8	2·4-in. B.L.	2	67	84*c*
‡*Amazon	Thornycroft	1908	280	26½	9·2	3	970		33·73				86*c*
¶‡*Crusader	White	1909	280	26	9·8	3	1045	15,500	35				99*c*
‡*Maori	Denny	1909	280	27	8·8	3	1035	15,500	33				103*c*
‡*Nubian	Thornycroft	1909	280	26½	9·1	3	985	15,500	34·88	2·4-in. B.L.	2	71	97½*c*
‡*Viking	Palmer	1909	280	27·3	8·7	3	1000	15,500	..				102½*c*
‡*Zulu	Hawthorn	1909	280	27	8·9	3	1000	15,500	34				94*c*
§Albacore	Palmer *b*	1908	215	21	7	..	440	7,000	26·75	3–12 prs.	2	43½	..
§Bonetta													
¶§Basilisk	White	1910	275	28			935		27·98				
‡§Beagle	John Brown	1909	269	26·7			860		27·12				
‡§Bulldog	,,	1909	269	26·7			860		27·4				
‡§Foxhound	,,	1909	269	26·7			860		27·7				
‡§Grasshopper	Fairfield	1909	271	27½			890		27·04				
¶§Harpy	White	1909	275	28			935		27·75				
‡§Mosquito	Fairfield	1910	271	27½	8·6	3	890	13,500	27·12	1·4-in., 3–12 prs.	2	96	120*c*
‡§Nautilus	Thames Ironworks	1910	267½	28			1050		28·1				
‡§Pincher	Fenny	1910	271½	28½			940		27·17				
‡§Racoon	Cammell Laird	1910	266	28			920		27·07				
‡§Rattlesnake	Lond. & Glasgow Co.	1910	270½	27½			900		27·03				
‡§Renard	Cammell Laird	1909	266	28			920		27·14				
‡§Savage	Thornycroft	1910	264	28	9·3	3	885		27·16				
‡§Scorpion	Fairfield	1910	271	27·9	..	3	890	12,500	27·1	1·4-in., 3–12 prs.	2	96	..
‡§Scourge	Hawthorn	1910	266½	28	8·6	3	925		27·06				
‡§Wolverine	Cammell Laird	1910	266	28	..	3	920		27·1				
§Stour	Cammell Laird *c*	1909	220	23·9	7·11	..	566	7,000	25·58	4·12-prs.	2	..	66½
§Test									25·62				
‡*Acorn	John Brown	1910											
‡*Alarm		1910											
‡*Brisk		1910											
‡*Cameleon	Fairfield	1910											
‡*Comet		1910											
‡*Goldfinch		1910											
‡*Fury	Inglis	Bldg.											
‡*Hope	Swan, Hunter	1910											
‡*Larne	Thornycroft	1910	240	25·6	7·10	3	780	13,500	27	2·4-in. B.L., 2–12-prs.	2	72	85*c*
‡*Lyra		1910											
‡*Martin		1910											
‡*Minstrel		1911											
‡*Nemesis	Hawthorn	1910											
‡*Nereide		1910											
‡*Nymphe		1911											
¶‡*Redpole	White	1910											
¶‡*Rifleman		1910											
¶‡*Ruby		1910											
‡*Sheldrake	Denny	1911											
‡*Staunch		1910											
‡*Acheron	Thornycroft												
‡*Ariel													
‡*Archer	Yarrow												
‡*Attack													
‡*Badger	Denny												
‡*Beaver													
‡*Defender													
‡*Druid													
¶‡*Ferret	White												
¶‡*Forester			Bldg.	240	25½	7·10	3	780	13,500	27	2 4-in. Q.F., 2 12-prs.	2	72	174
‡*Goshawk	Beardmore												
‡*Hind	John Brown												
‡*Hornet													
‡*Hydra													
‡*Jackal	Hawthorn												
‡*Tigress													
‡*Lapwing	Cammell Laird												
‡*Lizard													
‡*Phœnix	Vickers												
‡*Sandfly	Swan, Hunter												
‡3 boats	Yarrow	Bldg.	255	..	..	..	..	..	32	..	..	..	..
20 boats (programme 1911-12)	..	..	..	..	..	..	..	..	..	..	..	..	..

Fitted with turbines and for using oil fuel. † Have Thornycroft W.T. boilers. ‡ Fitted with modified Yarrow W.T. boilers.
§ Fitted with turbines and for using coal. ¶ Fitted with White-Forster boilers.
b Purchased after completion, March, 1909, to replace Tiger and Gala.
c Purchased after completion, December, 1909, to replace Blackwater and Lee. *e* Estimated.

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Great Britain—*continued.*

	Name or Number.	Built by.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal or Oil.
	TORPEDO BOATS.													
	FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
	025–027 (3 boats)..	Thornycroft.. ..	1886	127·5	12·5	6·2	1	60	600	21	2-3 prs.	3	..	10
	033	Yarrow..	1886	125	13	5·5	1	66	670	19·5	2-3 prs.	5	15	20
	034	White	1886	125	14·6	4	1	66	950	18–19	..	5	15	..
	041, 042 (2 boats), 049–056 (7 boats), 057, 058 (2 boats)	Thornycroft.. ..	1886	127·5	12·5	6·2	1	60	700	21	2–3 prs.	4	15	..
	065–068 (4 boats)..													
	071–074 (4 boats)..	Yarrow..	1886	125	13	5·5	1	75	700	19–20	2–3 prs.	5	15	20
	076–078 (3 boats)..													
	079	,, ...	1886	125	13	5·5	..	75	1,000	22·4	2–3 prs.	..	15	20
	80	,, ...	1887	135	14	6	1	105	1,540	23	4–3 prs.	5	21	30
	81 (*ex*-Swift).. ..	White	1885	150	17·5	..	1	125	..	..	6–3 prs.	3	25	35
	82, 83 (2 boats) ..	Yarrow..	1889	130	13·5	5·5	1	85	1,100	23	3–3 prs.	3	19	20
	85–87 (3 boats) ..	,, ...	1889	130	13·5	5·5	1	85	1,100	23	3–3 prs.	3	19	20
	88, 89 (2 boats) ..	,, ...	1894	142	14·75	4·5	1	112	1,600	..	3–3 prs.	3	18	20
	90	,, ...	1895	140	14·25	3·7	1	100	1,430	..	3–3 prs.	3	18	18
	91, 92 (2 boats) ..	Thornycroft.. ..	1894	140	15·5	7·5	1	130	2,400	23–24	3–3 prs.	3	18	25
	93	,, ..	1893	140	15·5	5·4	2	130	2,200	23·5	3-3 prs.	3	18	25
	95, 96 (2 boats) ..	White	1894	140	15·5	..	1	130	2,000	23·2	3–3 prs.	3	18	25
	97	Laird	1893	140	15·5	..	1	130	2,690	23·35	3–3 prs.	3	18	25
	98, 99 (2 boats) ..	Thornycroft.. ..	1901	160	17	8·4	1	178	2,850	25	3–3 prs.	3	32	20
	101	M'Arthur	1888	130·5	14	..	1	92	1,060	21	2–3 prs.	3	18	35
	102, 103 (2 boats)..	Thornycroft . .	1888	134·6	14·8	7·1	1	96	1,050	23·2	2-3 prs.	3	18	..
	104–105 (2 boats)..	White	1889	130	14·5	..	1	95	1,250	20	2–3 prs.	3	18	..
	107, 108 (2 boats)..	Thornycroft.. ..	1901	160	17	8·4	1	178	2,850	25	3–3 prs.	3	32	20
	109–113 (5 boats)..	,, ...	1902	166	17·25	8·4	1	200	2,900	25	3–3 prs.	3	32	42
	114–117 (4 boats)..	White	1903	165	17·6	8·8	1	205	2,900	25	3–3 prs.	3	32	28
* Pro. 1905–6 ¶	(5 boats (1–5) ..	¶White	1906	175	17‡	5·8	3	235	3,750	26	2–12 prs.	3	35	
* Pro. 1905–6 ¶	(5 boats (6–10)†	¶Thornycroft ..	1906–7	166‡	17‡	6·3	3	255	3,750	27·3	2–12 prs.	3	35	20*f*
* Pro. 1905–6 ¶	(2 boats (11–12)‡	¶Yarrow	1907	172	18	5·3	3	225	3,750	26	2–12 prs.	3	35	
* Pro. 1906–7	(4 boats (13–16) ..	White	1907	182	18	5·10	3	256	4,000	26	2–12 prs.	3	..	
* Pro. 1906–7	2 boats (17–18)‡..	Denny	1907	180	18	5·6	3	251	4,000	26	2–12 prs.	3	..	
* Pro. 1906–7	2 boats (19–20)†‡..	Thornycroft.. ..	1907–8	178·6	18·3	6.5	3	280	4,000	26	2–12 prs.	3	..	
* Pro. 1906–7	2 boats (21–22)‡..	Hawthorn	1907–8	185	18·6	6·6	3	308	4,000	26	2–12 prs.	3	..	23-5
* Pro. 1906–7	No. 23 ‡	Yarrow..	1907	177·3	18	5·4	3	253	4,000	26	2–12 prs.	3	..	
* Pro. 1906–7	No. 24 ‡	Palmer	1908	177	17·9	6·5	3	292	4,000	26	2–12 prs.	3	..	
* Pro. 1907–8 ¶	(4 boats (25–28)	White	1908	182	18	6·6	3	283	4,000	26	2–12 prs.	3	..	25
* Pro. 1907–8 ¶	2 boats (29–30)‡	Denny	1908	180	18	5·3	3	259	4,000	26	2–12 prs.	3	..	25‡
* Pro. 1907–8 ¶	2 boats (31–32)†	Thornycroft.. ..	1908	178·6	18·75	6 2	3	287	4,000	26·5	2–12 prs.	3	33	24‡
* Pro. 1907–8 ¶	2 boats (33–34)‡	Hawthorn	1909	185	18 6	6·5	3	3 6	4,000	26	2–16 prs.	3	..	23‡
* Pro. 1907–8 ¶	3 boats (35–36)‡	Palmer	1909	177	17·9	6 6	3	298	4,000	26	2–12 prs.	3	33	24

* Fitted with turbines and for using oil fuel. † Have Thornycroft W.T. boilers. ‡ Fitted with modified Yarrow W.T. boilers.
¶ These boats were originally named, as shown in the *Naval Annual* for 1906–1907. *e* Estimated. *f* 1000 knots.

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Great Britain—*continued.*

Number.	Built by.	Launched.	Dimensions.		Number of Screws.	Submerged Displacement.	Indicated Horse-Power.	Speed.		Torpedo Tubes.	Complement.	Fuel.
			Length.	Beam.				Surface.	Submerged.			
SUBMARINES.			Feet.	Feet.		Tons.		Knots.	Knots.			Tons.
5 boats (Nos. 1-5) ..	Vickers	1901-2	63·4	11·9	1	120	150	8	5	1	7	..
3 boats (Nos. A 2-A 4, 1902-3)	,, ...	1903	100	10	1	204	450	11	7	2	..	11
9 boats (Nos. A 5-A 13, 1903-4) ..	,, ...	1904	150	..	..	204	600	16	9	2	..	..
11 boats (B Class) ..	,, ...	1905	135	13½	..	313	600	13	9	..	..	15
11 boats (1905-6) C class	,, ...	1906-7	135	13½	..	313	600	14	10	2	..	15
5 boats (1906-7) C 12-16	,, ...	1907-8	135	13½	..	313	600	13	..	2	..	15
1 boat (1906-7) D 1 ..	,, ...	1908	..	..	2	604	1,200	16	10	3	..	..
2 boats (1906-7) C 17 & C 18	Chatham	1908	135	13½	..	313	600	13	..	2	..	15
2 boats (1907-8) C 19-C 20..	Chatham	1909	135	13½	..	321	600	13	10	2	..	15
10 (1907-8)— C 21-C 24 .. .. C 25-C 30	Vickers	(1908) (1909)	135	13½	..	321	600	13	..	..	..	15
2 (1908-9) C 33-C 34 .	Chatham	1910	135	13½	..	321	600	13	..	..	..	15
7 (1908-9)— C 31-C 32	Vickers	1909										
C 35-C 36	,, ...	1909										
C 37-C 38	,, ...	1910	135	13½	..	321	600	13	..	..	..	15
D 2	,, ...	1910										
2 (1909-10) D 7-D 8..	Chatham	1911	..	..	..	604	1200	..	..	..	..	..
4 (1909-10) D 3-D 6..	Vickers	Bldg.	..	..	..	..	..	..	..	..	..	..
2 (1910-11) E 1-E 2..	Chatham	Bldg.	176	22½	..	800	..	15	..	..	..	..
4 (1910-11) E 3 E 6..	Vickers	Bldg.	176	22½	..	800	..	15	..	..	..	..
2 (1911-12) E 7-E 8..	Chatham	Pro.	..	..	..	..	..	..	..	..	..	..
4 (1911-12) E 9-E 12.	Vickers	Pro.	..	..	..	..	..	..	..	..	..	..

TORPEDO FLOTILLAS OF THE DOMINIONS.

Australia.

Name or Number.	Built by.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
TORPEDO-BOAT DESTROYERS.			Feet.	Feet.	Feet.		Tons.		Knots.				
Yarra	Denny	1910	245¼	24½	7·8	3	700	9,500	27	1 4-in., 3 12-pdr..	3	66	130
Parramatta	Fairfield	9'0	245¼	24½	7·8	3	700	9,500	28·48				
Warrego	Fairfield*	1910	245	24½	7·8	3	700	9,500	28				
SUBMARINES.													
2 boats	Vickers	Bldg.	Details not published.										

Canada.

TORPEDO-BOAT DESTROYERS. 6 boats †	..	Pro.	Details not published.										

* Transported in sections and reconstructed in Australia.

† To be built in Canada; tenders received May, 1911.

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Argentine Republic.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Corrientes	Yarrow ..	1896	190	19·6	7·4	2	280	4,000	27·4 *t.*	1 14-pr.	3	54	80
Misiones	Yarrow ..	1896	190	19·6	7·4	2	280	4,000	26·0 *t.*	3 6-pr,	3	54	80
Entre Rios	Yarrow ..	1896	190	19·6	7·4	2	280	4,000	26·7 *t.*	Q.F., 2 M.	3	54	80
Santa Fé	Yarrow ..	1899	190	19·6	7·4	2	280	4,000	26	..	3	54	80
San Luis, Santa Fé, Santiago, Tucuman	Cammell ..	Bldg.	285	29·9	9·6	..	980	19,750	32	4 4-in.	4	110	225*
Mendoza, Rioja, Salta, San Juan ..	Nantes ..	Bldg.	283·2	28·3	9·9	..	950	18,000	32	4 4-in.	4	110	250*
Catamarca, Jujuy ..	Germania ..	Bldg.	286·7	27·1	9·6	2	940	18,000	33	4 4-in.	4	110	250*
Cordoba, La Plata ..	Schichau ..	Bldg.	279	29·6	7·3	..	890	19,000	32	4 4-in.	4	110	290*
FIRST CLASS—													
2 boats	Thornycroft	1890–1	150	14·5	5·2	2	110	1,500	24·52	3 3-prs.	3	27	22
6 boats	Yarrow ..	1890	130	13·5	6	1	85	1,200	23–24	2 3-pr. Q.F.	2	15	15

The two 150-ft. boats are named Comodoro Py and Murature.
The six 130-ft. boats are named Bathurst, Buchardo, Jorge, King, Pinedo, and Thorne.
* Also oil fuel 50–110 tons. Birkenhead boats, combined impulse and reaction turbines; French, Rateau; German, German Admiralty type.

Austria-Hungary.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYER—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Huszar	Yarrow ..	1905											
Streiter		1906											
Ulan		1906											
Wildfang	Trieste ..	1906											
Uskoke		1907											
Scharfschütze		1907	219·8	20·3	..	2	383	6,000	28·5	1 12-pr. 7 3-pr.	..	64	..
Dinara													
Csikos													
Pandur	Fiume ..	1908–9											
Reka													
Turul													
Velebit													
FIRST CLASS—													
Kaiman	Yarrow ..	1905											
Alligator													
Anaconda													
Drache													
Delplin													
Greif													
Hai													
Krokodil	Trieste ..	1906–7											
Moewe													
Narwal													
Pinguin													
Schwalbe			179·9	18·0	8·6	1	197	3,000	26	4 3-pr.	..	25	..
Seehund													
Wal													
Triton													
Alk													
Echse													
Hydra													
Kormoran	Fiume ..	1910											
Krake													
Molk													
Phönix													
Polyp													
Skorpion													
Boa													
Cobra	Yarrow ..	1898–9	152·6	15·3	7·6	1	133	2,000	24·3	2 3-pr.	3	24	30
Kigyo													
Python													
Viper	Yarrow ..	1896	147·6	14·9	7·6	1	130	2,000	26·5	2 3-pr.	2	26	30
Natter	Yarrow ..	1896	150	17·5	8·8	2	152	2,300	26·5	2 3-pr.	3	..	30
I—XII	Trieste and Fiume	1909 1910	142	14·4	5·0	..	110	2,600	26	2 3-pr.	2	..	..
SUBMERSIBLES—													
U 1 and 2	Pola	1908–9	100	9·8	..	..	216 240	720 200	12·2–7·3	..	3	..	..
U 3 and 4	Kiel, Germania	1908	141·8	12·6	..	2	235 295	600 320	12–9	..	2	17	..
U 5 and 6	Fiume	1909	105	21·0	..	..	235	500	11·4–10	..	2	..	..
U 7	Fiume						268	230					

About twenty torpedo boats (83 tons), built 1890–92, are of doubtful value.

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Brazil.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Para	Yarrow ..	1908	240	23·6	10	2	550	7,014	27·25	2 4-in., 4 3 prs.	2	..	140
Amazonas		1908						6,898	27·17				
Piahuy		1908						6,563	27·21				
Matto Grosso		1908						7,403	27·16				
Parahyba		1909						6,700	27·29				
Rio Grande do N.		1909						7,778	27·27				
Alagoas		1909						7,403	27·25				
Santa Catharina		1909						6,982	27·30				
Parana		1910						8,877	28·74				
Sergipe		1909						8,554	27·60				
FIRST CLASS—													
3 boats	Elbing ..	1892–3	152	17·2	7·9	2	130	2,200	28	2–1 prs.	3	24	30
Goyaz	Yarrow ..	1907	152·5	15·3	..	3	..	..	26·5	2–3 prs.	2	..	..
Gonzales	Thornycroft	..	152·5	15·3	..	3	..	..	26·5	2–3 prs.	2	..	..

Five additional destroyers and three large submarines are proposed
Two submarine boats, Jacinto Gomez and Mello Marques, probably valueless.

Chile.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Capitan Orella	Laird	1896	210	21·6	5·4	2	300	6000	30·17	1-12 pr. Q.F. 5-6 pr.	2	65	90
Capitan Munoz Gamero	Laird	1896	210	21·6	5·4	2	300	6000	30·42	1-12 pr. Q.F. 5-6 pr.	2	65	90
Teniente Serrano	Laird	1896	210	21·6	5.4	2	300	6000	30·35	1-12 pr. Q.F. 5-6 pr.	2	65	90
Guardia-Marina Riquelme	Laird	1896	210	21·6	5·4	2	300	6000	30·09	1-12 pr. Q.F. 5-6 pr.	2	65	90
Capitan Merino Tarpa	Laird	1901	210	21·6	5·4	2	350	6000	30	Do.	2	65	90
Capitan O'Brien													
FIRST CLASS—													
Injeniero Hyatt, Cirujano Videla, Injeniero Mutilla, Guardia-Marina Contreras, Capitan Thompson, and Teniente Rodriguez (Viper type)	Yarrow ..	{1896 1898}	152·6	15·3	7·9	1	140	2200	27·5–27·2	3-3 pr. Q.F.	3	28	46

Six destroyers of 1500 tons are projected.
The Thompson and Rodrigues were sent out in sections, and put together at Talcahuano and Valparaiso.

China.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
2 boats	Stettin ..	1897	123·5	21·7	..	..	120	..	20	2 1-pr.	3	20	16
4 boats	Kobe	1906–7	..	..	..	..	97	950	23	2 3-pr.	3	..	..
SECOND CLASS—													
1 boat	Foochow ..	1903	88·6	6·7	3·3	1	30	550	20·5				

About twenty older boats are said to be serviceable.

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Denmark.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
First Class—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Ormen	Copenhagen	1907	125	14·3	..	..	98	2,000	26	2 1-pr.	3	..	21
Hajen	Copenhagen	1896											
Havörnen	Copenhagen	1897	154·3	15·4	7·9	2	142	2,317	22·9	1 4·7-in. / 1 1-pr.	3	..	..
Söhjörnen	Copenhagen	1898											
Delfinen	Thornycroft	1883	111·5	12·6	6	1	59	620	20	1 mach.	2	14	9
Havhesten	Thornycroft	1888	137·9	14	7	1	94	1,200	22·8	2 1-pr. revs.	4	20	15
Hvalrossen	Thornycroft	1884	114	12·6	6·5	1	64	660	18·7	1 mach.	2	14	10
Makrelen	Copenhagen	1893	140	14·2	7	2	112	1,200	..	..	..	..	16
Narhvalen	Thornycroft	1888	137·9	14	7	1	94	1,200	22·3	2 1-pr. revs.	4	20	15
Nord Kaperen	Copenhagen	1893	140	14·2	7	2	112	1,200	..	2 1-pr. revs.	4	..	16
Sölöven	Thornycroft	1887	131	14·8	6·8	1	89	1,200	23·3	2 mach.	4	20	14
Sölven	Havre	1880	94·8	10·9	3·9	1	37	450	18·1	..	2	12	5
Springeren	Copenhagen	1891	119	13	4·9	1	81	800	18·3	2 1-pr. revs.	2	20	14
Stören	Thornycroft	1887	131	14·8	6·8	1	89	1,200	23	2 mach.	4	20	14
Sværdfisken	Thornycroft	1881	110	12	6	1	49	600	20·7	1 mach.	2	14	9

Destroyers (230 tons, 27 knots) building as follows:—Flyvefisken (Schichau); Soridderen (Yarrow); Soulven, Spaekhuggeren (Copenhagen dockyard); Tumleren, Vindhunden (Burmeister and Wain).

Electric submersible Dikkeren, delivered by F.I.AT. Co., Muggiano, 1909.—Length, 114 ft. 3 in.; beam, 11 ft.; 103–130 tons, 12·7½ knots. Two boats of the Holland type are to be built by the Whitehead company, one at Fiume, the other at Copenhagen dockyard.

France.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
Destroyers—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Arbalète	Normand	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Arc	Châlon	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Arquebuse	Normand	1902	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Ballste	Rouen	1903	183·9	20·11	10·3	2	300	6,000	29·4	1-9pr. 6-3prs.	2	62	75
Bélier	Nantes	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Bombarde	Havre (F.&C.)	1903	183·9	20·11	10·3	2	300	6,000	30·5	1-9pr. 6-3prs.	2	62	75
Bouclier	Normand	1910	233·8	24·9	9·7	3	715	15,000	31	2-3·9in.4-9pr.	4	62	160
Boutefeu	Bordeaux	1909	233·8	24·9	9·7	3	715	13,000	31	2-3·9in 4-9pr.	4	62	160
Branlebas	Normand	1907	193·9	21·3	10·3	2	320	5,000	28	1-9prs.6-3prs.	2	62	84
Carabine	Rochefort	1902	183·9	20·11	10·3	2	305	6,300	28	1-9pr. 6-3prs.	2	62	75
Carabinier	Rouen	1908	210·6	21·9	10·3	3	430	7,200	28	6–9 prs.	3	62	120
Carquois	Rochefort	1907	190·3	19·6	10·3	2	335	7,200	30	19-pr.4 3-prs.	2	62	37
Casque	Havre (F.&C.)	1909	233·8	24·9	9·7	3	715	13,000	31	2-3·9in.4-9pr.	4	62	160
Catapulte	Havre (F.&C.)	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Cavalier	Normand	1910	210·6	21·8	10·3	3	469	8,600	31·2	6–9 prs.	3	62	150
Chasseur	Normand	1909	210·6	21·9	10.3	3	454	7,200	28	6–9 prs.	3	62	120
Cimeterre	Bordeaux	1909	246·0	26	9·7	3	730	13,500	31	2-3·9in.4-9pr.	4	62	160
Claymore	Normand	1906	190·3	20·11	10·3	2	335	6,000	30·3	1-9pr. 6-3prs.	2	62	75
Cognée	Toulon	1907	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Coutelas	Rochefort	1907	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Dague	Bordeaux	1910	246·0	26	9·7	3	730	13,000	31	2-3·9in.4-9pr.	4	62	160
Dard	Rouen	1903	183·9	20·11	10·3	2	310	6,500	29·4	1-9pr. 6-3prs.	2	62	75
Durandal	Normand	1899	180·5	20·8	10·3	2	300	5,000	28	1-9pr. 6-3prs.	2	62	84
Epée	Havre (F.&C.)	1900	190·3	20·8	10·3	2	335	5,700	26	1-9pr. 6-3prs.	2	62	75
Epieu	Normand	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Escopette	Rochefort	1900	183·9	20·8	10·3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Etendard	Bordeaux	1908	210·6	21·9	10·3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Fanion	Bordeaux	1908	210·6	21·9	10·3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Fanfare	Normand	1907	193·9	21·3	10·3	2	320	5,000	28	1-9pr. 6-3prs.	2	62	84
Fantassin	Havre (F.&C.)	1909	210·6	21·8	10·3	3	469	8,600	30·5	6–9 prs.	3	62	150
Fauconneau	Normand	Bldg.	210·6	21·9	10·3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Faulx	Nantes	1911	233·8	24·9	9·7	3	715	13,000	31	2-3·9in.4-9pr.	4	62	160
Flamberge	Rochefort	1901	183·9	20·8	10·3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Fleuret	Rochefort	1907	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Fourche	Nantes	1909	233·8	24·9	9.7	3	715	13,000	31	2-3·9in.4-9pr.	4	62	160
Francisque	Rochefort	1904	183·9	20·11	10·3	2	305	6,300	28	1-9pr. 6-3prs.	2	62	75
Fronde	Bordeaux	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	65
Gabion	Rouen	1907	210·6	21·9	10·3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Glaive	Rochefort	1908	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Hache	Toulon	1908	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Hallebarde	Normand	1899	180·5	20·8	10·3	2	305	5,300	27·2	1-9pr. 6-3prs.	2	62	84
Harpon	Bordeaux	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Hussard	Lorient	1909	210·6	21·9	10·3	3	430	7,200	28	6–9 prs.	3	62	120
Janissaire	Rouen	1910	210·6	21·8	10·3	3	469	8,600	28·5	6–9 prs.	3	62	150
Javeline	Nantes	1903	183·9	20·11	10·3	2	300	7,000	29·3	1-9pr. 6-3prs.	2	62	75
Lasnquenet	Bordeaux	1909	210·6	21·8	10·3	3	469	8,600	28	6–9 prs.	3	62	150
Mameluck	Nantes	1909	210·6	21·8	10·3	3	469	8,600	28	6–9 prs.	3	62	150
Massue	Toulon	1908	190·3	20·11	10·3	2	335	6,000	28	1-9pr. 6-3prs.	2	62	75
Mortier	Rochefort	1906	190·3	20·11	10·3	2	335	6,300	28	1-9pr. 6-3prs.	2	62	75

N.B.—"F. & C." "Forges et Chantiers." "Normand" means that the boat has been built at that firm's yard at Havre.

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France—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—*cont.*													
Mousquet	Nantes	1902	183·9	20·11	10·3	2	300	6,300	30·2	1-9pr. 6-3prs.	2	62	75
Mousqueton	Châlon	1903	183·9	20·11	10·3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Obusier	Rochefort	1907	190·3	20·11	10·3	2	335	6,300	28	1-9pr. 6-3prs.	2	62	75
Orifiamme	Nantes	1908	210·6	21·9	10 3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Pertuisane	Rochefort	1900	183·9	20·8	10.3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Pierrier	Rochefort	1908	190·3	20·11	10.3	2	336	6,300	28	1-9pr. 63-prs.	2	62	75
Pique	Havre (F.&C.)	1900	190·3	20·8	10.3	2	335	5,700	26	1-9pr. 6-3prs.	2	62	75
Pistolet	Nantes	1903	183·9	20·11	10.3	2	300	6,000	28	1-9pr. 6-3prs.	2	62	75
Poignard	Rochefort	1909	190·3	20·11	10.3	2	335	6,000	28	1-9pr. 6 3prs.	2	62	75
Rapière	Rochefort	1901	183·9	20·8	10·3	2	300	5,700	26	1-9pr. 6-3prs.	2	62	75
Sabre	Rochefort	1904	183·9	20·11	10·3	2	305	6,300	28	1-9pr. 6-3prs.	2	62	75
Sabretache	Nantes	1908	210·6	21·9	10·3	3	430	6,000	28	6-9 prs.	3	..	..
Sagaie	Havre (F.&C.)	1902	183·9	20·11	10·3	2	300	6,000	30·1	1-9pr. 6-3prs.	2	62	75
Sape	Rouen	1907	210·6	21·9	10·3	3	430	6,000	28	1-9pr. 6-3prs.	3	..	..
Sarbacane	Rochefort	1903	183·9	20·11	10·3	2	305	6,300	28	1-9pr 6-3prs.	2	62	75
Spahi	Havre	1908	210·6	21·9	10·3	3	430	7,200	28	6-9 prs.	3	62	120
Stylet	Rochefort	1905	190·3	20·11	10·3	2	335	6,300	..	1-9pr. 6-3prs.	2	62	75
Tâkou*	Elbing	1898	193·7	21·0	..	2	280	6,000	25	6-3 pr. q.f.	2	62	67
Tirailleur	Bordeaux	1908	206·9	21·8	9·7	3	410	7,200	28	6-9 pr.	2	62	120
Tromblon	Rochefort	1905	190·3	21 0	10·3	2	335	6,300	25	6-3 pr. q.f.	3	62	67
Trident	Rochefort	1907	190·3	19·6	10·3	2	335	7,200	30	1-9pr. 6-3prs.	2	62	37
Voltigeur	Nantes	1909	210·6	21·9	10·3	3	430	7,200	28	6-9 prs.	3	62	120
Yatagan	Nantes	1900	190·3	20·8	10·3	2	335	5,700	26	1-9pr. 6-3prs.	2	62	33
Bory, Garnier, Rivière, Mehl, Dehorter 5	Normand, &c.	Bldg.	243	24·9	10 0	3	740	18,000	31	{2 3·9-in., 4 9 prs.}	4	62	120
M 78-83 (6)	Toulon, etc.	Bldg.	243	24·9	10 0	3	750	18,000	31	{2 3·9-in., 4 9 prs.}	4	62	120
Henry, Herbert (2)	Rochefort	Bldg.	214·6	21·6	7 8	3	450	8,600	28	6 9 prs.	2	62	..
SEA-GOING—													
Aquilon	Normand	1895	137·8	14·6	7·9	2	127	2,000	26·17	2-3 prs.	2	34	17
Archer	Normand	1893	138	14·7	6·5	2	131	1,250	21	2-3 prs.	2	26	17
Audacieux	Nantes	1900	144·2	15·2	10·0	2	152	4,200	30	2-3 prs.	3	..	18
Averne	Havre (F.&C.)	1894	141	16·4	9·3	2	133	1,500	24·4	2-3 prs.	2	27	16
Borée	Bordeaux	1900	147·7	16·7	8·0	2	160	4,400	30	2-3 prs.	2	..	18
Bourrasque	Normand	1901	147·7	16·7	8·0	2	160	4,400	31·41	2-3 prs.	2	..	18
Chevalier	Normand	1893	144·3	15·7	6·8	2	134	2,700	27·2	2-1 prs.	2	32	17
Cyclone	Normand	1898	144·2	15·2	10·0	2	152	4,200	30	2-3 prs.	2	..	18
Dauphin	Havre (F.&C.)	1894	141	16·4	9·3	2	137	1,500	25·22	2-3 prs.	2	34	16
Dragon	Normand	1892	138	14·7	8·2	2	129	1,400	25	2-3 prs.	2	26	15·5
Flibustier	Normand	1894	143	16·4	9·3	2	132	1,500	23·5	2-3 prs.	2	34	16
Forban	Normand	1895	144·2	15·2	10	2	135	3,200	31·2	2-1 prs.	2	..	..
Grenadier	Normand	1892	138	14·7	8·2	2	129	1,400	25·25	2-3 prs.	2	26	15·5
Grondeur	Havre (F.&C.)	1892	147·5	14·5	5	2	130	1,550	24	2-3 prs.	2	27	20
Kabyle	La Seyne	1891	144·3	14·7	7·7	2	128	1,100	21·6	3-3 prs.	2	27	17
Lancier	Normand	1893	138	14·7	8·2	2	128	1,400	25·79	2-3 prs.	2	26	15·5
Mangini	Nantes	1896	147·6	14·8	7·9	2	129	2,100	27·5	2-3 prs.	2	34	17
Mistral	Normand	1901	147·7	16·8	8·8	2	152	4,200	30	2-3 prs.	3	..	23
Orage	La Seyne	1891	144·3	14·7	7·7	2	128	1,100	21·7	3-3 prs.	2	26	17
Rafale	Normand	1901	147·7	16·7	8·0	2	160	4,400	31·47	2-3 prs.	2	..	18
Sarrasin	Bourdeaux	1893	139	14·7	7·7	2	131	1,100	20·5	3-3 prs.	2	26	14
Simoum	Havre (F.&C.)	1901	144·2	15·2	10·0	2	152	4,200	30	2-3 prs.	3	..	18
Siroco	Normand	1901	147·7	16·8	8·8	2	152	4,200	30	2-3 prs.	3	..	23
Tourmente	St. Denis	1893	141	16·4	9·3	..	132	1,500	24·6	2-3 prs.	2	25	15
Tramontane	Bordeaux	19 0	147·7	16·7	8·0	2	160	4,400	30	2-3 prs.	2	..	18
Trombe	Nantes	1900	144·2	15·2	10·0	2	152	4,200	30	2-3 prs.	3	..	18
Typhon	Havre (F.&C.)	1901	144·2	15·2	10·0	2	152	4,200	30	2-3 prs.	3	..	18
FIRST CLASS—													
201–4 (3 boats)	Normand	1897–8	121·4	13·4	8·6	1	84	1,700	25·9	2-1 prs.	2	23	10
206–211 (5 boats)	Bordeaux	1897–8	121·4	13·6	8·6	1	86	1,500	23·5	2-1 prs.	2	23	10
212–215 (4 boats)	Normand	1899	121·4	13·6	8·6	1	86	1,800	27	2-1 prs.	2	23	10
216–226 (11 boats)	{Cherbourg, Toulon, etc.}	1899–1902	121·6	13·6	8·6	1	86	1,500	23·5	2-1 prs.	2	23	10
227–235 (8 boats)	Bordeaux, etc.	1901	121·4	13·2	8·7	1	86	1,500	23·5	2-1 prs.	2	23	16
236–255 (20 boats)	Bordeaux, etc.	1902	121·4	13·2	8·7	1	90	1,500	23·5	2-1 prs.	2	23	10
256–257 (2 boats)	Bordeaux, etc.	1900	124·8	13·2	8·7	1	97	2,000	26·0	2-1 prs.	3	24	10
258–261 (4 boats)	Bordeaux	1902	124·8	13·2	8·7	1	97	2,000	26·0	2-1 prs.	3	24	10
262 (1 boat)	Creusot	1902	124·8	13·2	8·7	1	97	2,000	26·0	2-1 prs.	3	24	10
264–265 (2 boats)	Bordeaux	1902	124·8	13·2	8·7	1	97	2,000	26·0	2-1 prs.	3	24	10
266–276 (11 boats)	Bordeaux, etc.	1902	124·8	13·2	9·6	1	97	2,000	26·0	2-1 prs.	3	24	10
277–294 (18 boats)	Bordeaux, etc.	1904	124·8	14·0	9·6	1	97	2,000	26·0	2-1 prs.	3	26	10
295–317 (23 boats)	Normand, etc.	1905											
318–367 (50 boats)	Havre, etc.	1905–7	124·8	14·0	9·6	1	97	2,000	26	2-1 prs.	3	26	10
368–369 (2 boats)	Toulon	1906											

* Captured from the Chinese at Taku, 1900.

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France—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
SUBMARINE—													
Aigrette‡	Toulon ..	1904	117·6	12·9	8·3	1	172	200	10·5	..	..	20	..
Algérien	Cherbourg ..	1901	118	9·2	..	1	146	250	8 13	..	..	9	..
Alose	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Anguille	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Bonite	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Calypso‡	Toulon ..	1907	154·3				344				7	..	..
Castor	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Cigogne‡	Toulon ..	1904	117·6	12·9	8·3	1	172	200	10·5	..	..	20	..
Circé ‡	Toulon ..	1907	154·3				344				7	..	..
Dorade	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Emeraude	Cherbourg ..	1906	146	12·9	12·0	2	390	600	12	..	6	16	..
Espadon‡	Cherbourg ..	1901	111·6	12·4	5·4	1	106–200	250	8–12	..	2	10	..
Esturgeon	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Follet	Rochefort ..	1901	135·8	9 5	9·5	1	185	..	8–12½	..	..	9	..
Français	Cherbourg ..	1901	118	9·9	..	1	146	250	8–13	..	..	9	..
Gnome	Rochefort ..	1901	135·8	9·5	9·5	1	185	..	8–12½	..	..	9	..
Grondin	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Korrigan	Rochefort ..	1901	135·8	9·5	9·5	1	185	..	8–12½	..	..	9	..
Loutre	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Ludion	Cherbourg ..	1902	77	7·6	8·0	1	68	60	8	..	..	5	..
Lynx	Cherbourg ..	1902	77	7·6	8·0	1	68	60	8	..	..	5	..
Méduse	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Naïade	Cherbourg ..	1902	77	7·6	8·0	1	68	60	8	..	..	5	..
Opale	Cherbourg ..	1906	146	12·9	12·0	2	390	600	12	..	6	..	..
Otarie	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Oursin	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Perle	Cherbourg ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Phoque	Rochefort ..	1904	77	7·6	8·0	1	68	60	8	..	..	5	..
Protée	Cherbourg ..	1902	77	7·6	8·0	1	68	60	8	..	..	5	..
Rubis	Cherbourg ..	1907	154·3	12·9	12·0	2	390	600	12	..	6	16	..
Saphir	Toulon ..	1908	146	12·9	12·0	2	390	600	12	..	6	..	..
Silure‡	Cherbourg ..	1901	111·6	12·4	5·4	1	106–200	250	8–12	..	2	10	..
Sirène‡	Cherbourg ..	1901	111·6	12·4	5·4	1	106–200	250	8–12	..	2	10	..
Souffleur	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Thon	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Topaze	Cherbourg ..	1908	146	12·9	12·0	2	390	600	12	..	6	..	..
Triton‡	Cherbourg ..	1901	111·6	12·4	5·4	1	106–200	250	8–12	..	2	10	..
Truite	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Turquoise	Toulon ..	1908	146	12·9	12·0	2	390	600	12	..	6	..	..
Dauphin	Cherbourg ..	1904	122·8	10·2	7·6	2	168	220	10‡	..	..	..	..
Z	Rochefort ..	1904	135·8	9·10	9·10	1	202	190	11	..	..	..	..
Argonaute	Toulon ..	1905	160·6	13·9	9.0	1	301	330	11	..	4	20	..
Pluviôse, Ventôse, Nivôse, Germinal, Floréal, Prairial, Messidor, Thermidor, Fructidor, Vendémiaire Brumaire, Frimaire‡	Cherbourg ..	1907 1909 1910	160	16·4	13·6	2	398	700	7¾–12½	..	7	24	..
Papin, Fresnel, Berthelot‡	Rochefort ..	1908 1909	160	16·4	13·6	2	398	700	7¾–12½	..	7	24	..
Monge, Ampère, Gay-Lussac‡	Toulon ..	1908 & 1909	160	16·4	13·6	2	398	700	7¾–12½	..	7	24	..
Foucault, Euler, Franklin, Watt, Cugnot, Giffard, Faraday, Volta, Newton, Montgolfier Bernoulli, Joule, Coulomb, Arago, Curie, Le Verrier, (16, Prog. 1905–6)‡	Cherbourg .. Rochefort .. Toulon ..	1909 & Bldg.	160	16·4	13·6	2	398	700	7¾–12½	..	7	24	..
Amiral Bourgeois‡	Cherbourg	Bldg.	184·6	26·3	..	2	555–735	1,560	10–15	..	7	25	..
Archimède‡		Bldg.	211·9	30·2	..	2	577–810	1,700	10–15	..	7	27	..
Mariotte‡		Bldg.	212·6	..	..	2	530–625	1,440	10–15	..	6	25	..
Charles Brun‡		Bldg.	144·6	13·6	..	2	355–480	..	10–15	..	7	20	..
Clorinde‡	Rochefort ..	Bldg.	174	16·9	10·9	2	391	1,300	15·8	..	7	20	..
Cornélie‡													
Gustave Zédé‡	Cherbourg ..	Bldg.	239 6	19·8	14·4	2	728	..	..	..	..	..	..
Néréide‡													

‡ Submersibles.

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Germany.

Name or Number.	Where built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
D 3, D 4 (2 boats)	Elbing ..	1888	184	21·8	9·6	2	300	2,000	20	4 6-pr. 2 1-pr. revs.	3	48	90
D 5, D 6 (2 boats)	Elbing ..	1888–9	190·3	23	9·6	2	320	3,000	22¼	4 6-pr. 2 1-pr. revs.	3	48	90
D 7, D 8 (2 boats)	Elbing ..	1890	190·3	23	9·9	2	380	3,500	22¼	6 Q.F.	3		
D 9	Elbing ..	1894	197·0	24·3	9·9	2	380	4,500	26	6 Q.F.	3		
D 10	Chiswick ..	1898	211·9	19 6	8·1	2	310	5,800	28·5	5 3-pr.	3	52	80
Taku (ex Hai Ying)	Elbing ..	1898	183·7	21·0	..	2	280	6,000	30	6 3-prs.	2	..	67
S 90-101 (12 boats)	Elbing ..	1900	200	23	8·9	2	350	6,000	27·5	3 3-pr.	3		
S 102–107 (6 boats)	Elbing ..	1900–1	200	23	8·9	2	350	6,000	27·5	3 3-pr.	3		
G 108–113 (6 boats)	Kiel(Germania)	1901–2	200	22	8·9	2	350	6,000	29·2	3 3-pr.	3	49	100
S 114–119 (6 boats)	Elbing ..	1902–3	200	23	8·9	2	350	6,000	29·2	3 3-pr.	3	49	100
S 120–125 (6 boats)	Elbing ..	1904	200	23	8·9	2	350	6,000	29·2	3 3-pr.	3	49	100
S 126–131 (6 boats)	Elbing ..	1904–5	205	23	..	2	420	6,000	30	3 6-pr.	3	56	100
G 132–136 (5 boats)	Kiel (Germania)	1906	207·4	23	8·9	2	420	6,500	28	4 6-pr.	3	..	..
G 137	Kiel(Germania)	1907	226·4	25·4	9·8	3	570	10,000	32	1 14-pr. 3 3 pr.	3	72	170
S 138–149 (12 boats)	Elbing.. ..	1906–7	331	25·7	8·9	2	530	10,000	30	1 23-pr. 3 4-pr.	3	72	170
V 150–161 (12 boats)	Stettin(Vulcan)	1907–8	269	25·7	10·0	2	670	10,500	30	2 23-pr. 2 M.	3	83	175
V 162–164 (3 boats)	Stettin(Vulcan)	1908–9	..	..	..	..	616	15,000	30	2 23-pr. 2 M.	3	..	160
G 169–173 (5 boats)	Kiel(Germania)	1908–9	..	..	..	..	616	15,000	30	2 23-pr. 2 M.	3	..	160
G 174–175 (2 boats)	Kiel(Germania)	1909											
S 176–179 (4 boats)	Elbing ..	and	233	25·9	7·6	..	640	1,600	32·5	2 23-pr. 2 M.	4	83	180
V 180–185 (6 boats)	Stettin(Vulcan)	1910											
G 186–191	Kiel(Germania)	Bldg.	233	25·9	7·6	..	610	16,000	32·5	2 23-pr. 2 M.	4	83	180
V 192–197	Stettin(Vulcan)	Bldg.	233	25·9	7·6	..	640	16,000	32·5	2 23-pr. 2 M.	4	83	180
FIRST CLASS—													
S 42—S 65 (24 boats)	Elbing ..	1892	150	15·6	6·7	..	85–88	1,600	20–22¼	2 1-pr. revs.	2	..	17
S 66—S 73 (8 boats)	Elbing ..	1893	154·3	16·4	..	2	110 145	1,600	..	..	3		
S 74—S 87 (14 boats)	Elbing ..	1894–8	158·2	16·9	9·0	2	140	2,300	26	2 1-pr. revs.	3	..	32
G 88—G 89 (2 boats)	Kiel(Germania)	1898	154·3	16·5	..	..	160	2,500	26	2 mach.	3	22	

NOTE.—The German destroyers (S 90 to V 185) are given above in groups showing successive yearly programmes, the last series being that of 1909.

The Estimates of 1911 provide for the building of two divisions of destroyers (12 boats). A submarine boat (U 1), 180 tons, 128 ft. long, 8 ft. 10 in. beam, submerged displacement 240 tons, speed 12 and 9 knots, launched at the Germania Yard, August 30, 1905; U 2 to U 12 built at Germania Yard and Danzig; others building. The V destroyers have A.E.G. turbines; S boats, Schichau; and most of the G boats Parsons turbines (G 173, Zoelly).

Greece.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Naukratoussa .. Thyella .. .. .. Sphendoni .. .. Lonchi	Yarrow ..	1906	220	20·6	7·2	2	350		32·1 31·79 31·84 32·53	2 12, 4 6-pr.	2	58	80
Nike.. . .. .. Aspis .. .. .. Doxa.. .. .. .. Velos	Stettin (Vulkan)	1906	220	20·6	7·2	2	350	..	30	2 12, 4 6-pr.	2	58	80

Some additional destroyers are projected.

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Italy.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons		Knots.				Tons.
Destroyers—													
Fulmine, Lampo, Freccia, Dardo, Strale, Euro, Ostro, Nembo, Turbine, Aquilone, Borea, Meteoro, Tuono, Zeffiro, Espero, Bersagliere, Artigliere, Granatiere, Lanciere, Alpino, Corazziere, Pontiere, Carabinieri, Fucilieri, Garabaldino	Sestri (Odero)	1898	200	20·4	5·4	2	298	4,800	28	1 12-pr. 3 6-pr. Q.F.	3	43	60
	Elbing (Schichau)	1899 1901	196·8	21·3	5·8	2	320	6,000	30	1 12-pr. Q.F., 5 6-pr.	2	53	60
	Naples (Pattison)	1901 1902	210	19·4	7·6	2	330	6,000	30	1 12-pr. Q.F., 5 6-pr.	2	53	66
	Naples (Pattison)	1904	210	19·4	7·6	2	330	6,000	30	1 12-pr. Q.F., 5 6-pr.	2	53	60
	Genoa (Ansaldo, Armstrong)	1906 1907 1909 1910	211·6	20·0	7·6	3	365	6,000	30	4 12-pdr.	3	55	82
Impavido, Impetuoso, Indomito, Insidioso, Intrepido, Irriquieto, 6 others	Pattison (Naples) 6 Ansaldo (Genoa), 3 Orlando (Leghorn) 3	Bldg. & Pro.	246	24·6	7·6	..	610	..	30	1 4·7 in. 4 12-pr.	2	..	..
First Class—													
Aquila, Sparviero, Nibbio, Avvoltoio, Falco	Elbing ..	1888	152	17·2	7·9	2	130	2,200	26·6	2 3-pr. Q.F., 1 1-pr. Q.F., 1 1-pr. rev.	3	24	40
Pellicano	Sestri (Odero)	1899	157·4	19	14·8	2	147	2,700	25	2 3-pr.	2	28	24
Condore	Sestri (Ansaldo)	1898	154·3	16·8	6·9	2	136	2,500	27	2 3-pr.	2	27	16
Sirio, Sagittario, Spica, Scorpione, Serpente, Saffo	Elbing ..	1905 1906 1906 1905 1905 1906											
Alcione, Ardea, Albatros, Alcrone, Astore, Arpia	Odero	1905 1906	164	19·6	6·3	2	215	2,900 3,250	25	2 3-pr.	2	..	40
Orione, Orsa, Olympia, Orfeo	Genoa (Ansaldo)	1905 1906											
Gabbiano	Spezia	1907											
Pegaso	Naples (Pattison)	1905											
Perseo, Procione, Pallade, Cigno		1905 1905											
Cassiopea, Calliope, Clio, Centauro, Canopo	Naples (Pattison)	1906 1907 1906 1907 1907	164	17·4	7·0	2	200	3,000	25·4 26·6	3 3-pr.	3		40
Calipso, Climene	Naples (Pattison)	1908 1909											
Second Class—													
No. 117	..	1895	131·2	16·4	..	1	85	1,000	..	2 1-pr. Q.F.	2	17	17
Nos. 136–8, 140–2 (6 boats)	Italy	1893–94	131·2	16·4	..	1	85	1,000	22	2 1-pr. Q.F.	2	17	17
Nos. 147, 149–152 (5 boats)	Italy ..	1894–5	131·2	16·4	..	1	85	1,000	22	2 1-pr. Q.F.	2	17	17

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Italy—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
SUBMARINE—													
Delfino	Spezia	1894	78·6	10·1	..	1	111	150	10–12	..	2	12	..
Glauco, Squalo, Narvalo, Otaria, Tricheco	Venice, &c.	1906 / 1907 / 1909	120	14·3	..	..	180 / 230	..	15	..	2	..	..
Foca, Medusa, Velella, Argo, Falea	Muggiano	1908 & Bldg.	139·6	14·2	..	..	241 / 297	750	10·15 / 8·3	..	2	..	..
Fantina, Salpe	Spezia (Cantieri)												
Fisalis, Zoea	Legborn												
Nautilus, Nereide	Venice	..	..	..	..	..	..	..	..	..	..	..	..
G. Pullino, G. Ferraris	Spezia	..	..	..	..	..	..	..	..	..	..	..	..
Atropo	Kiel (Germania)	..	..	..	..	..	..	..	..	..	..	..	..

Ten destroyers (500 tons) and thirty torpedo-boats are in the programme of 1911. The new Italian destroyers have Thornycroft water-tube boilers.

Japan.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—													
Murakumo	Thornycroft	1898											
Shinonome	Thornycroft	1898											
Yugiri	Thornycroft	1898	210·0	19·5	7·2	2	307	5,800	30 to 31	1 12-pr., 5 6-prs.	2	54	80
Shiranui	Thornycroft	1899											
Kagerou	Thornycroft	1899											
Usugumo	Thornycroft	1900											
Shirakumo	Thornycroft	1901	216·7	20·7	8·3	2	373	7,400	31	1 12-pr., 5 6-prs.	2	59	96
Asashio	Thornycroft	1902											
Ikadsuchi	Yarrow	1898											
Akebono	Yarrow	1899	220·0	20·6	9·6	2	311	6,000	31	1 12-pr., 5 6-prs.	2	55	95
Sazanami	Yarrow	1899											
Oboro	Yarrow	1899	220·3	20·6	9·6	2	311	6,000	31·62	1 12-pr., 5 6-prs.	2	..	90
Niji	Yarrow	1899	220·3	20.6	9·6	2	308	6,000	31·15	1 12-pr., 5 6 -prs.	2	..	90
Kasumi	Yarrow	1902	220·3	20·6	9·6	2	335	6,000	31	1 12-pr., 5 6-prs.	2	..	..
Asagiri	Yokosuka	1902											
Hurusame	Yokosuka	1902	220·3	20·6	9·6	2	374	6,000	29	1 12-pr., 5 6-prs.	2	..	..
Murasame	Yokosuka	1902											
Yamahiko	Port Arthur	1903											
Fumizuki	Port Arthur	1903	196·9	18·4	11·5	2	250	6,000	27	1 12-pr., 5 3-prs.	2	..	80
Satsuki	St. Petersburg	1902											
Hatsushima	Yokosuka	1905											
Yayoi	Yokosuka	1905											
Kisaragi	Yokosuka	1905											
Hibiki	Yokosuka	1906											
Wakaba	Yokosuka	1905											
Hatsuyuki	Yokosuka	1906											
Kamikaze	Yokosuka	1905											
Ariake	Yokosuka	1905											
Fubuki	Yokosuka	1905											
Arare	Yokosuka	1905											
Yunagi	Maizuru	1906											
Oite	Maizuru	1905	220·3	20·6	9·6	2	374	6,000	29	6 12-pr.	2	..	..
Asakase	Kobe	1905											
Harukase	Kobe	1905											
Shigure	Kobe	1906											
Hatsuharu	Kobe	1906											
Yuguri	Sasebo	1905											
Yudachi	Sasebo	1906											
Mikadzuki	Sasebo	1906											
Nowake	Sasebo	1906											
Uschio	Kure	1905											
Nenohi	Kure	1905											
Shiratsuyu	Nagasaki	1906											
Shirayuki	Nagasaki	1906											

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Japan—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—*contd.*			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Matsukaze	Nagasaki	1906											
Shirotaye	Nagasaki	1906											
Asatsuyu	Osaka	1907											
Hayakase	Osaka	1906											
Kikutsuki	Uraga	Bldg.											
Minatsuki	Uraga	Bldg.	220·3	20·6	9·6	2	374	6,000	29	6 12-prs.	2	..	..
Nagatsuki	Uraga	1907											
Utsuki	Uraga	1907											
Isonami	Yokosuka	1909											
Uranami	Yokosuka	1909											
Ajanami	Yokosuka	1909											
Kaifu	Maizuru	1909											
Umikaze	Nagasaki	1910	..	..	..	..	1200	20,500	35	2 4-in., 5 3-in.	3	..	..
Yamakase	..	Bldg.											
FIRST CLASS—													
Hayabusa	Normand	1898											
Kasasagi	Normand	1899											
Manadzuru	Normand	1899	147·7	16·0	8·2	2	150	4,200	30	1 6-pr., 2 3-prs.	3	26	30
Chidori	Normand	1900											
Shirataka	Elbing	1899											
Asataka	Kure	1903											
Hato	Kure	1903											
Hibari	Kure	1903											
Kari	Kure	1903											
Kiji	Kure	1903											
Tsubame	Kure	1903	147·7	16·0	8·2	2	150	4,200	27	1 6-pr., 2 3-prs.	3	26	30
Hashitaka	Kawasaki	1902											
Kamome	Kure	1904											
Otori	Kawasaki	1904											
Sagi	Kure	1902											
Uzuri	Kure	1902											
Fukuriu	Kiel	1895	..	..	..	..	115	..	..	..	..	..	..
SECOND CLASS—													
2 boats	Kobe	1901	..	..	..	..	83	..	..	..	..	..	..
10 boats	Yarrow	1900	152·6	15·3	7·9	..	..	1,900	27	2 3-prs	3	..	36
16 boats	Elbing	1891-9	..	..	..	..	..	..	..	..	..	..	..
1 boat (No. 24)	Normand	1891	118	13·1	6·9	1	80	1,200	23	2 1-prs.	2	21	10
2 boats	Normand	1898	121·4	13·6	8·6	1	86	1,800	27	1 3-pr.	2	..	10
SUBMARINES—													
5 boats	[U.S.A. Fore River,	1904-5	65	12	..	..	120	..	8	..	1	..	..
2 boats	Japan	1906	..	..	..	..	60·80	..	..	..	1	..	..
2 boats	Vickers	1908	135	13·5	..	..	325	..	14	..	2	..	..
5 boats	Japan	Bldg.	..	..	..	..	..	..	..	..	..	..	..

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Netherlands.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
2 boats (1909)*	Flushing ..	{Bldg. / Pro.}	230	20·6	..	2	415	7,500	30	{4 12-pr., / 4 M.}	2	84	80
2 boats (1910).. ..													
FIRST CLASS—													
Ardjoeno	Yarrow ..	1886	125	13	6	1	83	800	21	2 1-prs.	2	16	10
Batok	Amsterdam	1887	125	13	6·9	1	83	725	20	2 1-prs.	2	16	10
Cycloop	Amsterdam	1887	125	13	6·9	1	83	680	20	2 1-prs.	2	16	10
Dempo	Amsterdam	1887	125	13	6·9	1	83	760	20	2 1-prs.	2	16	10
Empong	Yarrow ..	1888	128	13	6·2	1	91	1,100	24·1	2 1-prs.	3	16	15
Foka	Amsterdam	1888	128	13	6·2	1	90	1,000	22·1	2 1-prs.	3		
Goentoer	Amsterdam	1888	128	13	6·2	1	90	950	21	2 1-prs.	3		
Habang	Amsterdam	1888	128	13	6·2	1	90	930	21·7	2 1-prs.	3		
Idjen	Amsterdam	1889	128	13	6·2	1	90	840	20·6	2 1-prs.	3		
Krakatau	Amsterdam	1889	128	13	6·2	1	90	750	19·1	2 1-prs.	3		
Scylla	Yarrow ..	1900	130	13·6	6·0	1	77	1,200	24·3	2 1-prs.	3	18	20
Hydra	Yarrow ..	1900	130	13·6	6·0	1	77	1,200	24·4	2 1 prs.	3	18	20
Ophir	Yarrow ..	1901	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Pangrango	Yarrow ..	1901	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Rindjani	Yarrow ..	1901	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Smeroe	Fijenoord ..	1904	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Tangka	Fijenoord ..	1904	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Wajang	Fijenoord ..	1904	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Minotaurus, Python	Flushing ..	1904	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Zeeslang													
Krokodil													
Draak	Flushing ..	1905	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Sfinx													
Scylla													
Meijndert Jentjes ..													
Johan van Brakel ..	Flushing, Rotterdam, & Fijenoord	1904	154·3	16·5	7·9	1	144	2,000	25	2 3-prs.	3	24	40
Van de Rijn													
Willem Willemsze..													
Roemer Vlacq ..													
Pieter Constant ..	Do... ..	1906	154·3	16·5	7·9	..	144	2,000	26	2 3-prs.	3	24	40
Jacob Cleydijk ..													
Janssen de Haan ..													

All the Poplar destroyers have Yarrow water-tube boilers, and the later ones are fitted for the consumption of oil fuel. Four additional destroyers are to be built for the Indian Marine, first instalment voted 1911.

Submarine boat, No. 1 (120 tons). Nos. 2 and 3 are in hand at Flushing, 132-150 tons, 11-8 knots, 2 tubes. Another is being built by Messrs. Whitehead, Fiume, 380 tons, 151 ft. 6 in. long, 16 knots (surface), 11 knots (submerged) speed, and a fifth is provided for.

* Named Wolf or Fret.

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Norway.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Valkyrien	Elbing ..	1896	190	24·3	9·3	1	374	3,300	23·2	2 12-pdrs. 4 1-pdrs.	2	59	90
Draug	Christiania..	1908	226	25·0	..	2	550	7,500	27·0	6 12-pdrs.	3	71	95
Troll..	Christiania..	Bldg.											
FIRST CLASS—													
Varg (8), Raket (9)	Christiania..	1894	111·5	12·4	..	1	43	..	..	..	2	..	..
Hval, Delfin, Hai (3 boats)	Elbing ..	1896	128·0	15·0	6·9	1	84	1,100	24·5	2 1·4-in. Q.F.	2	..	..
Storm, Brand, Trods	Christiania..	1899	128·0	15·0	..	1	84	1,100	23	2 1·4-in. Q.F.	2		
Laks, Sild, Sael, Skrei	Christiana ..	1900	128·0	15·0	6·9	1	84	11,000	23	2 1·4-in.	2	..	..
Kjeck, Hvas, Dristig, Kvik, Djerv, Blink, Glint, Hauk, Falk	Christiana ..	1898 1903	111·5	14·5	6·3	1	65	650	19	2 1·4-in.	2	..	..
Skarv, Teist, Lom, Jo, Grib	Christiana ..	1906–7	134·5	14·9	..	1	100	1,700	25·0	2 3-pr.	..	..	..
Ravn, Orn	Christiana ..	1903	119	14·9	6·4	1	73	1,035	22·5	2 1·4-in.	2	14	13
SUBMARINE—													
Kobben	Germania Kiel	1909	131·6	14·9	..	..	205 255	440 250	12 9	..	3	..	..

Provision made for a torpedo boat, Skarv class, in 1910.
A submarine of the Kobben class is to be built.

Portugal.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Destroyer..	Lisbon ..	Bldg.	240	23·6									
5 boats (5–9)	Elbing ..	1890–92											
Mindello	Lisbon ..	1893	..	..	..	..	..	..	12				

Three torpedo boats building in France.

Roumania.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Naluka	Havre	1888	120·7	11·3	6·9	1	56	578	21	1 1-pr. rev.	2	..	12
Sborul	Havre	1888	120·7	11·3	6·9	1	56	578	21	1 1-pr. rev.	2	..	12
Smeul	Havre	1888	120·7	11·3	6·9	1	56	578	21	1 1-pr. rev.	2	..	12

8 100 ft. Torpedo Vedette Boats built by the Thames Ironworks. 4 built by Schichau, 1904.

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Russia.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
BALTIC SEA.													
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Kondratenko, Okhotnik, Pogranitschnik, Siberskij-Strelok ..	Abo and Helsingfors	1905	250·3	27·0	8·9	2	625	7,300	25–26	2 12-pdrs. 6 6-pdrs.	3	100	191
Amuretz, Gaidamak, Ussurietz, Vsadnik ..	Kiel (Germania)	1905 1906	232·9	23·7	7·9	2	560	6,500	25–26	2 12-prs. 6 6-prs.	3	98	180
Emir Bukharsky, Dobrovoletz Finn, Moskvityanin	Helsingfors	1905	238	27·0	8·6	2	580	6,500	25–26	2 12-pdrs. 6 6-pdrs.	3	98	134
Donskoi – Kasak, Kazanetz, Sabaikalets, Steregushtshi, Strashny, Trukhmenetz - Stavropolski, Ukraina, Voiskovoi	Riga	1904 1906	239·9	23·7	7·6	2	508	6,200 7,020	25–27	2 12-pdrs. 4 6-pdrs.	2	90	50 120
Prytki	Poplar.. ..	1895	190	18·6	7·0	2	240	4,400	29.7	1 12-pr, 3 3-pr	2		
Revy, Retivy, Ryany, Rezviyi, Prosorlivy, Pilky, Ridny, Poslushny, Protchny, Poratsuchtchi, Prontsitelny, Podvitsny	Abo, Ishora & Nevsky ..	1898	196·9	18·4	11·5	2	240	3,800	27	1 12-pr, 3 3-pr	2	55	53
Bravi, Vidny, Bodry	Nevsky and Ishora ..	1900–2	196 9	18·4	11·5	2	350	6,000	27	1 12-pr, 5 3-pr	3	62	80
Grozni, Grosiashtchi	St. Petersburg	1904	196·9	18·4	11·5	2	350	6,000	27	1 12-pr, 5 3-pr	3	62	80
Tverdy, Totschny, Trevozhny	Abo	1905	196·9	18·4	11·5	2	240	6,000	27	1 12-pr, 5 3-pr	3	62	80
Iskousny, Ispolnitelni, Kriepky, Legky	La Seyne ..	1905	185·9	21·0	7·5	2	324	5,600	26	1 12-pr, 5 3-pr 2 M	2	60	30 100
Lovki, Letutshi, Lichoi	Havre (Normand)	1905	185·8	21·0	7·5	2	324	5,600	27·5	1 12-pr, 5 3-pr 2 M	2	60	30 100
Boievoi, Bditelny, Burni, Vnimatelni, Vnushitelni, Vynoslivny, Sergieff, Yurasovsky, Sviereff, Dmitrieff	Elbing Schichau	1905–6	203·9	23·0		2	365	6,500	28		3		95
Silni, Storoshevoi, Stroiny, Rasyashtshy, Rastoropny, Burakoff, Dyelni, Dostoiny, Deyatelni, Myrtky, Molodetsky, Moshtshny, Malleteff Anastasoff	St. Petersburg and Ochta	1905 1907	185·9	21·0	7·5	2	335 56	5,600	26	1 12-pr, 5 3-pr 2 M	2	60	30 100
FIRST CLASS—													
Aspen	Ishora.. ..	1895	127·9	15·7	6·9	1	98	1,250	21	..	2	..	17
Domeness	Putiloff ..	1895	127·9	15·7	6·9	1	98	1,250	21	..	2	..	17
Hogland	Ishora.. ..	1894	128	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
Nargen	Ishora.. ..	1894	128	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
Rochensalm	Putiloff ..	1890	136·5	13	7·8	..	81	1,100	21				
Sestoretsk..	Normand ..	1894	118	13·2	8·6	1	80	1,300	24	2 1-prs.	2	21	10
Transund	Ishora.. ..	1895	127·9	15·7	6·9	1	98	1,250	21	..	2	..	17
2 boats	St. Petersburg	1896	128	16	6·9	2	85	1,200	22	2 1-prs.	2	13	17
6 boats	St. Petersburg	1897	138	14·7	9·9	2	120	..	25	..	2	26	
8 boats	Nevsky ..	1898	..	..	..	..	118						
BLACK SEA.													
DESTROYERS—													
Baranoff, Shestakoff, Pustchin, Sazarenny	Nicolaieff ..	1907–8	241·6	27·0	7·9	2	614	6,500	25	6 12-pdrs.	3	90	200
Zavidni, Zavetni, Zharki, Zhutki, Zhivoi, Zhivulka, Zhivutshtshy ..	Nicolaieff ..	1903–4	210	21·2	7	2	350	5,500	27	1 12-pr, 5 3-pr	2		
Stremitelni, Strogi, Smetlivy, Svirepy	Abo	1901	190·4	18·5	11·5	2	240	3,800	27	1 12-pr, 3 3-pr	2	..	60
Zadorni, Zorki, Zvonki	Nicolaieff ..	1903	210	21·2	7	2	350	5,500	27	1 12-pr, 5 3-pr	2		
FIRST CLASS—													
A. B. C. (3 boats) ..	Nicolaieff ..	1893	126	..	..	..	81	..	21				
Adler..	Elbing ..	1890	152·0	17·2	7·9	2	130	2,200	27·4	2 1 prs.	3	24	40
Anakria	Elbing ..	1890	128·0	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
Anapa	Odessa.. ..	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
Altodorj	Odessa.. ..	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
D. E. (2 boats) ..	Sebastopol ..	1893	128	..	..	..	85	..	22				
FAR EAST.													
DESTROYERS—													
Bespochtchadni, Bestrachni, Beschumni (3 boats)	Elbing ..	1899	196·9	18·4	11·5	1	350	6,000	27	1 12-pr, 5 3-pr	2		
Grozovoi, Vlastni ..	Havre(F.&C.)	1900–2	186·0	20·8	10·3	2	300	5,000	28	1 12-pr 5 3-pr	2	..	80
Bolki	Nevsky ..	1900	196·9	18·4	11·5	1	350	6,000	28	1 12-pr, 5 3-pr			

Submarine Piotr Koschka (experimental), Delfin (77 ft., 175 tons), Graf Sheremeteff completed at St. Petersburg; Akula, Alligator, Drakon, Kaiman, Krokodil, Minoga (400 tons, Lake type) built and building; also Kefal, Akula, Makrel, Bytshok, Nalim, Kata, Paltus, Delfin, Karp, Kambala, Karas (240 tons); Bialuga, Pescar, Shtshuka, Som, Sterliad; 13 others built or building, Lossos in the Black Sea. A submersible of 500 tons has been provided for by subscription. Two destroyers of 1320 tons and 35 knots are building at the Putiloff and Baltic Yards, St. Petersburg.

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Spain.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Terror	Clydebank ..	1896	220	22	5·6	2	300	6,000	28	2 12-pr. 2 6-pr. 21-pr.	2	67	100
Audax													
Osado	Clydebank ..	1897	225	25·6	5·8	2	400	7,500	30	2 14-pr. 2 6-pr. 21-pr.	2	70	90
Proserpina													
Bustamenté	Cartagena ..												
Villamil	Cartagena ..	Bldg.	220	22	7·5	..	370	6,250*	28	5 6-pr.	2	..	..
Requescens	Cartagena ..												
FIRST CLASS—													
24 boats	Cartagena ..	Bldg. Pro.	165	16·6	..	..	180	3,750*	26	3 3-pr.	3	..	..
Azor	Poplar	1887	134·5	14	6	1	108	1,600	24	4 3-pr.	3	23	25
Halcón	Poplar	1887	134·5	14	..	1	108	1,600	24	4 3-pr.	3	23	25

Azor and Halcón re-boilered by Yarrow (water-tube). * Turbines and Normand type boilers.

Sweden.

TORPEDO BOATS.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYER—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Mode	Yarrow ..	1902	220·3	20 6	8·9	2	400	6,800	32·4	1 12-pr. 5 6-prs.	2	55	95
Magne	Thornycroft	1905											
Wale	Malmo ..	1906											
Ragnar	Malmo ..	1909											
Sigurd	Gothenburg	1909	216·9	20·8	8·2	2	430	7,200	30·0	2 12-prs. 4 6-prs.	2	63	90
Vidar	Malmo ..	1909											
Hugin	Gothenburg	1909											
Munin	Malmo ..	1910											
FIRST CLASS—													
Komet	Elbing ..	1896	128	15·9	6·11	1	92	1,056	23·0	2 1·9-in. Q.F.	2	16	17
Blixt	Carlskrona ..	1898	128	15·9	6·11	1	92	1,260	23·5	2 1·9-in. Q.F.	2	18	17
Meteor	Carlskrona ..	1899	128	15·9	6·11	1	92	1,330	23·8	2 1·9-in. Q.F.	2	18	17
Stjerna	Carlskrona ..	1899	128	15·9	6·11	1	92	1,250	23·4	2 1·9-in. Q.F.	2	18	17
Orkan	Carlskrona ..	1900	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Vind	Carlskrona ..	1900	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Bris	Carlskrona ..	1900	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Virgo	Carlskrona ..	1902	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Mira	Carlskrona ..	1902	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Orion													
Sirius	Carlskrona ..	1903	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Kapella													
Pleiad	Normand ..	1905	125	15	6·6	1	96	1,900	26	2 1·5-in. Q.F.	2	18	—
Vega	Carlskrona ..	Bldg.	125	17·5	8·6	1	105	1,900	25	1 6-pr. 1 1·4-in.	2	..	..
Vesta													
Spica, Astrea, Iris, Thetis	Bergsund and Gothenburg	Bldg.	125	17·5	8·6	1	105	1,900	25	1 6-pr. 1 1·4-in.	2	..	..
Altair													
Antares													
Argo	Stockholm ..	1908	128	17·5	8·6	..	110	..	25	2 6-prs.	2	18	..
Arcturus													
Perseus, Polaris ..	Bergsund ..												
Regulus, Rigel ..	Stockholm ..												
A, B, C, D	Carlskrona & Gothenburg	Bldg.	..	..	..	..	..	..	..	..	..	..	..
SECOND CLASS—													
No. 75	Stockholm ..	1892	100·5	11·6	6·3	1	49	460	18·9	1 mach.	2	14	9
No. 77	Carlskrona ..	1891	100·5	11·6	6·3	1	49	460	18·9	1 mach.	2	14	9
No. 79	Stockholm ..	1902	104·0	12·5	6·1	1	49			1 1·5-in. Q.F.	2	14	
No. 81	Stockholm ..	1902	104·0	12·5	6·1	1	49			1 1·5-in. Q.F.	2	14	
No. 83	Stockholm ..	1903	104·0	12·5	6·1	1	49			1 1·5-in. Q.F.	2	14	
No. 85	Stockholm ..	1903	104·0	12·5	6·1	1	49			1 1·5-in. Q.F.	2	14	
THIRD CLASS—													
Nos. 141, 143, 145, 147, 149 (5 boats) ..	Stockholm ..	1879 1890	55·0	10·7	4·1	2	21	80	10	..	2	..	1·5
SUBMERSIBLES—													
Enroth	Stockholm ..	1902	82·0	13·0	11·6	2	146	100	12–11	..	1	..	..
Hajen	Stockholm ..	1903	65·0	11·6	..	..	120	200	10–7	..	..	..	..
Hvalen	Muggiano ..	1908	139·6	14·2	6·9	..	185–235	750	15–7½	..	2	15	..

Three submersibles provided for, of which one (Hvalen type) is being built at Stockholm. Four destroyers proposed.

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Turkey.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Berk-Efshan	Kiel	1894	187	21·6	..	2	270	1,200	25	6 1-pr. revs.	2		
Tajjar	Kiel	1894	187	21.6	..	2	270	..	25	6 1-pr. revs.	2		
Samsoun	Bordeaux ..	1907–8	184·9	19·6	9·6	2	280	..	28	1 9-pr. 6 3-pr.	2	..	26
Basra													
Taasos													
Yar-Hissar													
Jadighiar-i-Millet ..	Elbing (Schichau)	1909	236·6	25·6	12·3	2	610	14,000	35	2 3·4 in. 2 M.	3	..	160
Muavenet-i-Millet ..													
Mahabet-i-Watan ..													
Nuhum-i-Hamijet ..													
FIRST CLASS—													
Eliagot, Ac-Hisar ..	Sestri Ponente	1904	165·8	18·6	4·5	..	165	2,200	27				
Angora, Urffa, Antalia, Tokat, Deradj, Kulahia, Mossul ..	Sestri Ponente	1906	165·8	18·6	4·5	..	165	2,200	24				
A. B.	Sestri Ponente	1901	166	18·6	4·0	2	145	2,400	26	2·1 pr.	2	..	16
Edjder (No. 10) ..	Kiel	1890	152·7	18·9	7·4	2	150	2,200	23	5 3-prs. Q.F.	2		
5 boats	Kiel	1889–90	126·7	15·4	8·6	1	85	1,300	22	2 1-pr. revs.	2	21	8
2 boats	Kiel	1892	127	..	..	..	..	..	22				

Ten destroyers are intended to be purchased or built.

United States.

Name or Number	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament. Guns.	Torpedo Tubes.	Complement.	Maximum Coal Capacity.
DESTROYERS—			ft. in.	ft. in.	ft. in.		Tons.		Knots.				Tons.
Smith	Philadelphia	1909	289 0	26 0	8 0	3	700	10,362*	29·5 *t.*	5 3-in., 2 M.	3 18-in.	89	285
Lamson	Philadelphia	1909	289 0	26 0	8 0	3	700	10,000*	29·5			89	285
Preston	Camden, N.J.	1909	289 0	26 0	8 0	3	700	10,000*	28			89	270
Flusser	Bath, Me. ..	1909	289 0	26 0	8 0	3	700	11,842*	30·41 *t.*			89	295
Reid	Bath, Me. ..	1909	289 0	26 0	8 0	3	700	12,734*	31·82 *t.*			89	295
Paulding	Bath, Me. ..	1910	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Drayton	Bath, Me. ..	1910	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Roe	Newport News, Va.	1909	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Terry		1909	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Perkins	Quincy, Mass.	1910	289 0	26 1¼	8 4	2	742	12,000†	29·50			89	216
Sterrett	Quincy, Mass.	1910	289 0	26 1¼	8 4	2	742	12,000†	29·50			89	216
McCall	Camden, N.J.	1910	289 0	26 1¼	8 4	3	742	12,000*	33·0			89	210
Burrows	Camden, N.J.	1910	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Warrington ..	Philadelphia	1910	289 0	26 1¼	8 4	2	742	12,000‡	30			89	210
Mayrant	Philadelphia	1910	289 0	26 1¼	8 4	2	742	12,000‡	29·50			89	210
Monaghan ..	Newport News	Bldg.	289 0	26 1¼	8 4	3	742	12,000*	30			89	210
Trippe	Bath, Me. ..	Bldg.	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Walke	Quincy, Mass.	Bldg.	289 0	26 1¼	8 4	2	742	12,000†	29·50			89	216
Ammen	Camden, N.J.	Bldg.	289 0	26 1¼	8 4	3	742	12,000*	29·50			89	210
Patterson	Philadelphia	1910	289 0	26 1¼	8 4	3	742	12,000*	30			89	210
Bainbridge ..	Philadelphia	1901	245 0	23 7	6 6	2	420	8,000	28·45	2 14-pr., 5 6-pr. ◊	2	64	139
Barry	Philadelphia	1902	245 0	23 7	6 6	2	420	8,000	28·13	2 14-pr., 5 6-pr.	2	64	139
Chauncey	Philadelphia	1901	245 0	23 7	6 6	2	420	8,000	29·64	2 14-pr., 5 6-pr.	2	64	139
Dale	Richmond ..	1900	245 0	23 7	6 6	2	420	8,000	28	2 14-pr., 5 6-pr.	2	64	139
Decatur	Richmond ..	1900	245 0	23 7	6 6	2	420	8,000	28·10	2 14-pr., 5 6-pr.	2	64	139
Hopkins	Wilmington	1902	244 0	24 6	6 0	2	408	8,456	29·02	2 14-pr., 5 6-pr.	2	64	150
Hull	Wilmington	1902	244 0	24 6	6 0	2	408	9,119	28·04	2 14-pr., 5 6-pr.	2	64	150
Lawrence	Quincy, Mass.	1900	242 3	22 3	6 2	2	400	8,400	28·41	2 14-pr., 5 6-pr.	2	64	115
Macdonough ..	Quincy, Mass.	1901	242 3	22 3	6 2	2	400	8,400	28·03	2 14-pr., 5 6-pr.	2	64	115
Paul Jones ..	San Francisco	1900	245 0	23 7	6 6	2	420	8,000	28·91	2 14-pr., 5 6-pr.	2	64	139
Perry	San Francisco	1900	245 0	23 7	6 6	2	420	7,950	28·32	2 14-pr., 5 6-pr.	2	64	139
Preble	San Francisco	1901	245 0	23 7	6 6	2	420	7,370	28·03	2 14-pr., 5 6-pr.	2	64	139
Stewart	Morris Heights	1902	245 0	23 7	6 6	2	420	8,000	29·69	2 14-pr., 5 6-pr.	2	64	139
Truxtun	Baltimore ..	1901	248 0	23 3	6 0	2	433	8,300	29·58	2 14-pr., 5 6-pr.	2	64	232
Whipple	Baltimore ..	1901	248 0	23 3	6 0	2	433	8,300	28·24	2 14-pr., 5 6-pr.	2	64	232
Worden	Baltimore ..	1901	248 0	23 3	6 0	2	433	8,300	29·86	2 14-pr., 5 6-pr.	2	64	232

Henley (Quincy, Mass), and 5 other destroyers, Paulding class, 742 tons, provided for 1910.

* Parsons turbines. † Curtis turbines. ‡ Zoelly turbines.

◊ Guns of destroyers of this class are Driggs Semi-Automatic Quick-Firers.

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United States—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament. Guns.	Torpedo Tubes.	Complement.	Maximum Coal Capacity.
Sea-Going—			ft. in.	ft. in.	ft. in.		Tons.		Knots.				
Bagley	Bath	1900	157 0	17 0	4 7	2	167	4,200	29·15	3 3-pr.	3	29	..
Bailey	Morris Heights	1899	205 0	19 0	6 0	2	235	5,600	30·20	4 6-pr.	2	..	20
Barney	Bath	1900	157 0	17 0	4 7	2	167	4,200	29·04	3 3-pr.	3	29	..
Biddle	Bath	1900	157 0	17 0	4 7	2	167	4,200	28·57	3 3-pr.	3	29	..
Blakely	Boston	1902	175 0	17 6	4 8	2	165	3,000	25·58	3 3-pr.	3	29	70
De Long	Boston	1901	175 0	17 6	4 8	2	165	3,000	25·52	3 3-pr.	3	29	70
Du Pont	Bristol, R.I.	1897	175 0	17 8	4 8	2	165	..	28·58	4 1-pr.	3	32	76
Foote	Baltimore	1896	160 0	16 1	5 0	2	142	2,000	24·53	3 1-pr.	3	24	44
Porter	Bristol, R.I.	1896	175 0	17 8	4 8	2	165	..	28·63	4 1-pr.	3	32	76
Rodgers	Baltimore	1896	160 9	16 1	5 0	2	142	2,295	24·49	3 1-pr.	3	24	44
Rowan	Seattle, Wash.	1898	170 0	17 0	5 11	2	182	3,200	27·07	4 1-pr.	3	32	60
Shubrick	Richmond	1899	175 0	17 6	4 8	2	165	3,375	26·07	3 3-pr.	3	29	70
Stockton	Richmond	1899	175 0	17 6	4 8	2	165	3,275	25·79	3 3-pr.	3	29	70
Tingey	Baltimore	1902	175 0	17 6	4 8	2	165	3,000	24·94	3 3-pr.	3	29	70
Wilkes	Morris Heights	1901	175 0	17 6	4 8	2	165	3,495	25·99	3 3-pr.	3	29	70
Winslow	Baltimore	1897	160 0	16 1	5 0	2	142	2,000	24·82	3 1-pr	3	24	44
Cushing	Bristol, R.I.	1890	138 9	14 3	4 11	2	105	1,720	22·50	3 1-pr.	3	23	36
Dahlgren	Bath	1899	147 0	16 4	4 7	2	146	4,200	30	4 1-pr.	2	..	32
Davis	Portland, Ore.	1898	146 0	15 4	5 4	2	132	1,750	23·41	3 1-pr.	3	..	..
Ericsson	Dubuque, Iowa	1894	149 7	15 6	4 9	2	120	1,800	24	4 1-pr.	3	23	35
Farragut	San Francisco	1898	213 6	20 8	6 0	2	273	5,878	30·13	4 6-pr.	2	..	76
Fox	Portland, Ore.	1898	146 0	15 4	5 4	2	132	1,750	23·13	3 1-pr.	3	..	..
Goldsborough	Portland, Ore.	1902	194 8	20 5	5 0	2	247·5	6,000	27·40	4 6-pr.	2	..	131
Morris	Bristol, R.I.	1898	138 3	15 6	4 1	2	105	1,750	24	3 1-pr.	3	..	28
Somers	Schichau, Elbing	1898	149 3½	17 5	..	2	145	1,900	17·5	..	..	..	..
Stringham	Wilmington	1899	225 0	22 0	6 6	2	340	7,200	25·33	7 6-pr.	2	..	120
T. A. M. Craven	Bath	1899	147 0	16 4	4 7	2	146	4,200	30	4 1-pr.	2	..	32
Thornton	Richmond	1900	175 0	17 6	4 8	2	165	3,000	24·88	3 3-pr.	3	29	70
Third Class—													
Gwin	Bristol, R.I.	1897	99 6	12 6	3 3	1	46	850	20·88	1 1-pr.	2	..	8
Mackenzie	Philadelphia	1898	99 3	12 9	4 3	1	65	850	20	1 1-pr.	2	..	15·3
McKee	Philadelphia	1898	99 3	12 9	4 3	1	65	850	19·82	2 1-pr.	2	..	..
Talbot	Bristol, R.I.	1897	99 6	12 6	3 3	1	46	850	21·15	1 1-pr.	2	..	8·8
Submarine—													
Adder	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Grampus	S. Francisco	1902	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Holland	Elizabethport	1896	54 0	10 3	..	1	74	150	8	..	1	5	..
Moccassin	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Pike	S. Francisco	1902	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Plunger	Elizabethport	1902	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Porpoise	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Shark	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Cuttlefish	Quincy, Mass.	1906	80 6	13 0	..	..	170		8½—10				
Viper	Quincy, Mass.	1909											
Tarantula	Quincy, Mass.	1909											
Octopus	Quincy, Mass.	1906	106 0	..	..	..	273						
Stingray	Quincy, Mass.	1909	..	..	..	..	239–274	500	..	..	2	..	..
Tarpon		1909											
Bonita		1909											
Snapper		1909											
Narwhal		1909											
Grayling		1909	..	..	..	..	278–340	..	..	..	4	..	..
Salmon		1909											
Skipjack	Quincy, Mass.	Bldg.	160·0	13 0	..	..	525	..	9½—14	..	6	..	..
Sturgeon													
Carp	San Francisco												
Barracuda													
Pickerel	Seattle												
Skate													
Thrasher	Philadelphia												
Tuna	Newport News												
Seal	Newport News	1911											
Nos. 28–31 (4)	Quincy, &c.	Bldg.											
Nos. I.–III. (3)*	..	1910	..	..	..	..	..	..	22	..	..	..	..

* Sub-surface destroyers.

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PLANS

OF

BRITISH AND FOREIGN SHIPS.

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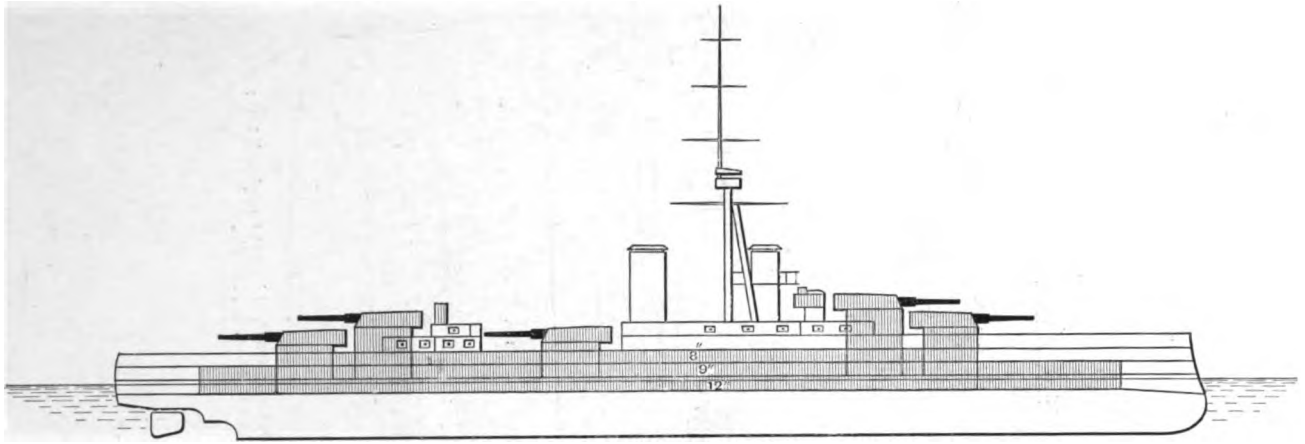
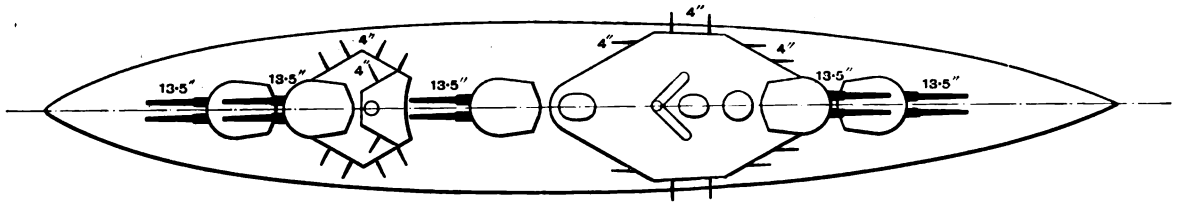
GREAT BRITAIN.

BATTLESHIPS.

Orion. **Conqueror.** **Monarch.** **Thunderer.**





Length, 545 ft. ; 22,500 tons ; Speed, 21 knots ; Building ;
Armament, 10—13·5 in., 24—4 in.

See page 190.

PLATE 1.
b 2

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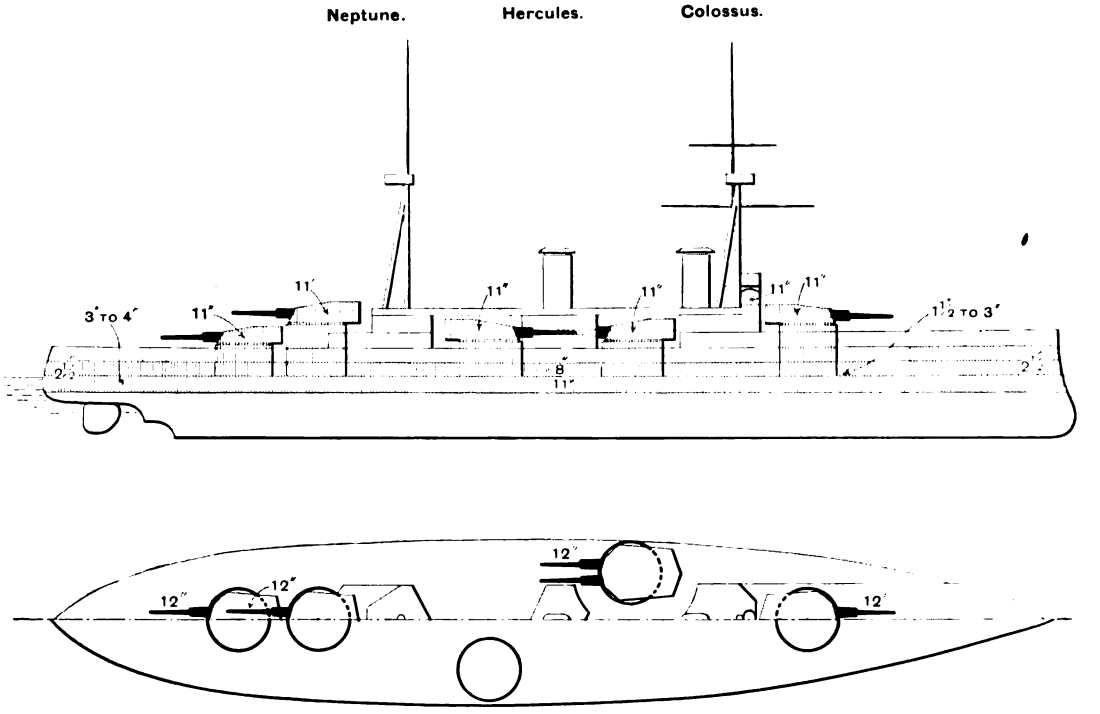
BATTLESHIPS.



Length, 510 ft.; 20,000 tons; Speed, 21 knots; Completed, 1911;
Armament, 10—12 in., 16—4 in.

See page 17.

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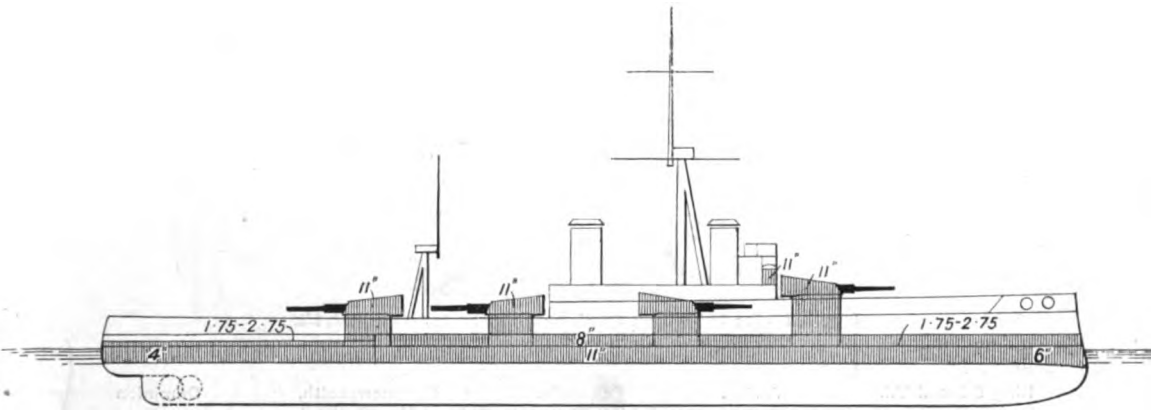
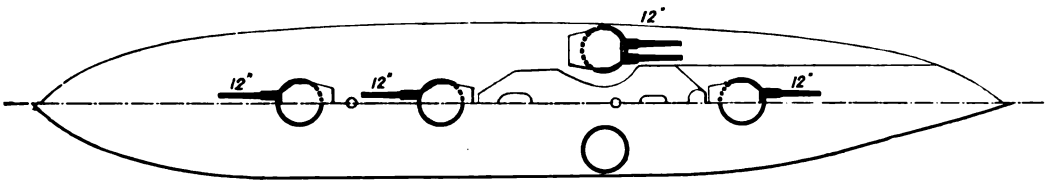
GREAT BRITAIN.

BATTLESHIPS.

Dreadnought. **Bellerophon.** **Temeraire.** **Superb.** **Collingwood.**
St. Vincent. **Vanguard.**





Dreadnought.—Length, 490 ft. ; 17,900 tons ; Speed, 21·8 knots ; Completed, 1906 ;
Armament, 10—12 in., 24—12 pr.

Bellerophon
Temeraire
Superb —Length, 490 ft. ; 18,600 tons ; Speed, 21·6–22 knots ; Completed, 1909 ;
Armament, 10—12 in., 16—4 in.

Collingwood
St. Vincent
Vanguard —Length, 500 ft. ; 19,250 tons ; Speed, 21·5–22·1 knots ; Completed, 1910 ;
Armament, 10—12 in., 20—4 in.

N.B.—The masts are differently arranged in the later ships.

See page 196.

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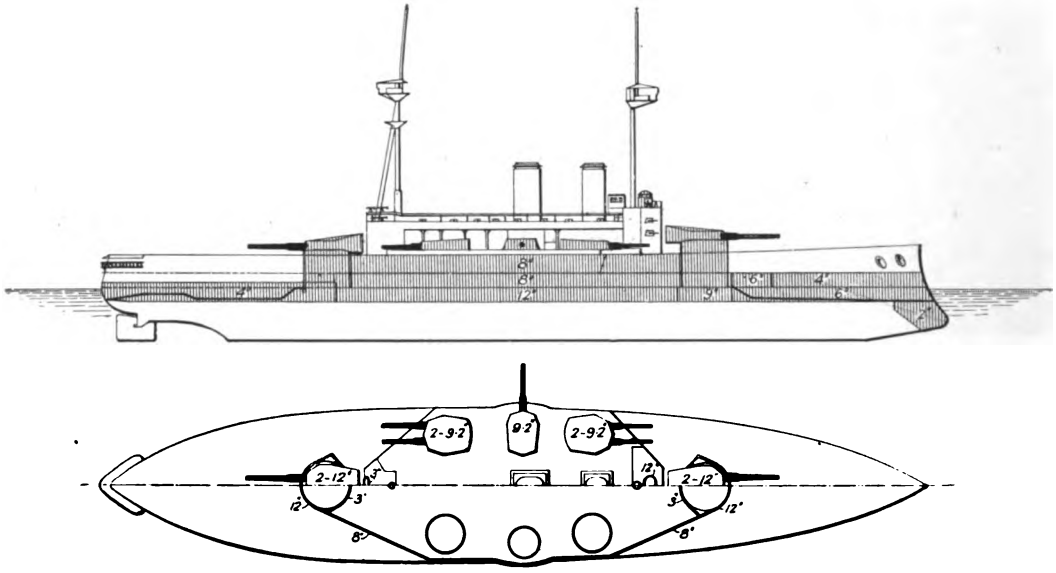
GREAT BRITAIN.

BATTLESHIPS.

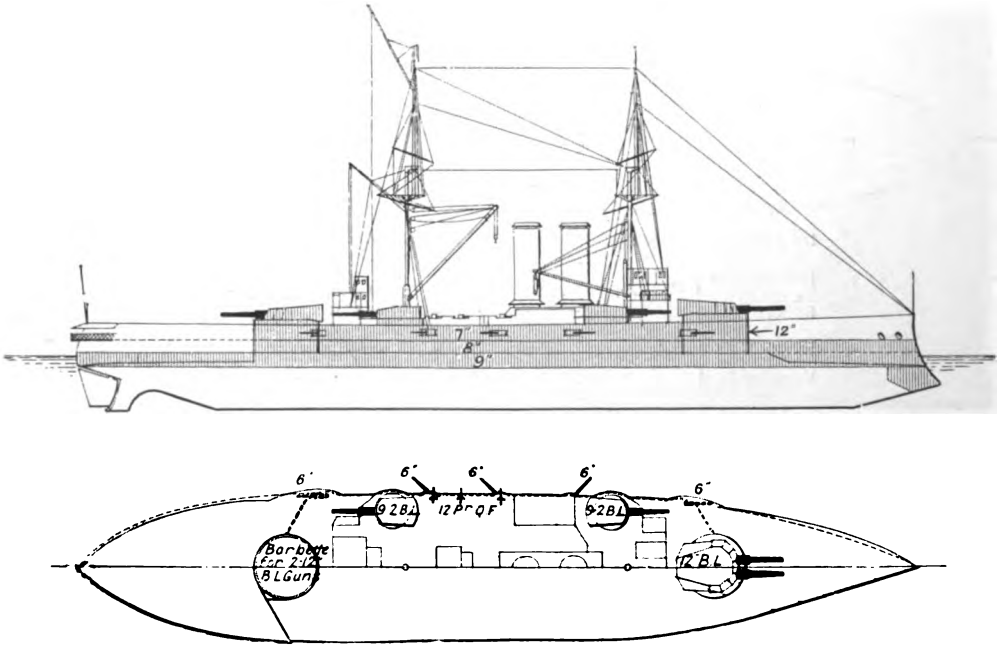
Lord Nelson. **Agamemnon.**



Length, 410 ft.; 16,500 tons; Speed, 18·75–18·9 knots; Completed, 1908;
Armament, 4—12 in., 10—9·2 in., 24—12 pr., 5 small.

See page 199.

King Edward VII. **Africa.** **Hibernia.** **Britannia.** **Hindustan.** **Commonwealth.** **New Zealand.** **Dominion.**



Length, 425 ft.; 16,350 tons; Speed, 18·5–19·5 knots; Completed, 1905–1906;
Armament, 4—12 in., 4—9·2 in., 10—6 in., 14—12 pr., 17 small.

See page 199.

PLATE 4.

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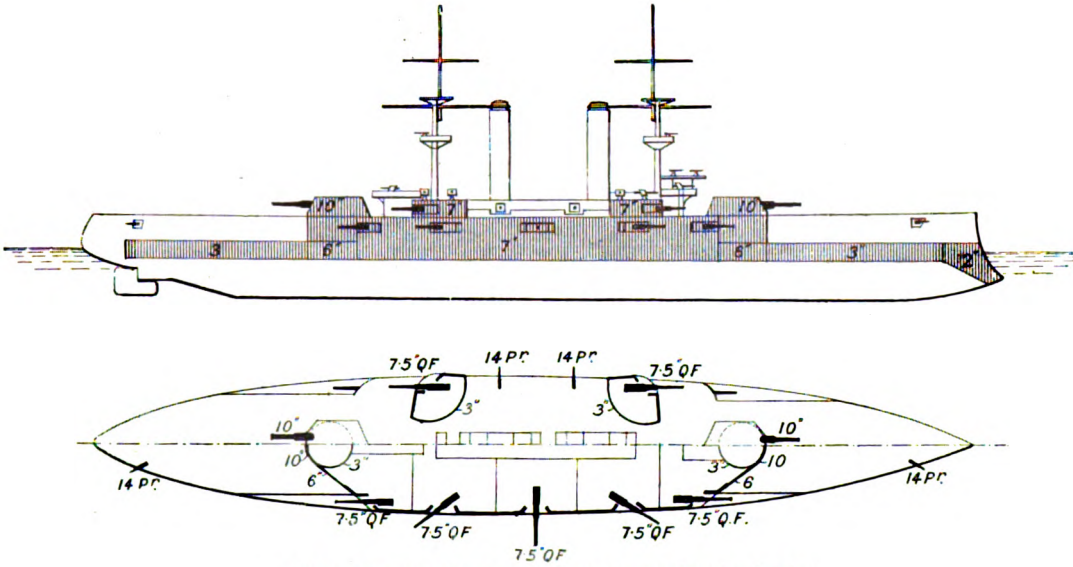
GREAT BRITAIN.

BATTLESHIPS.

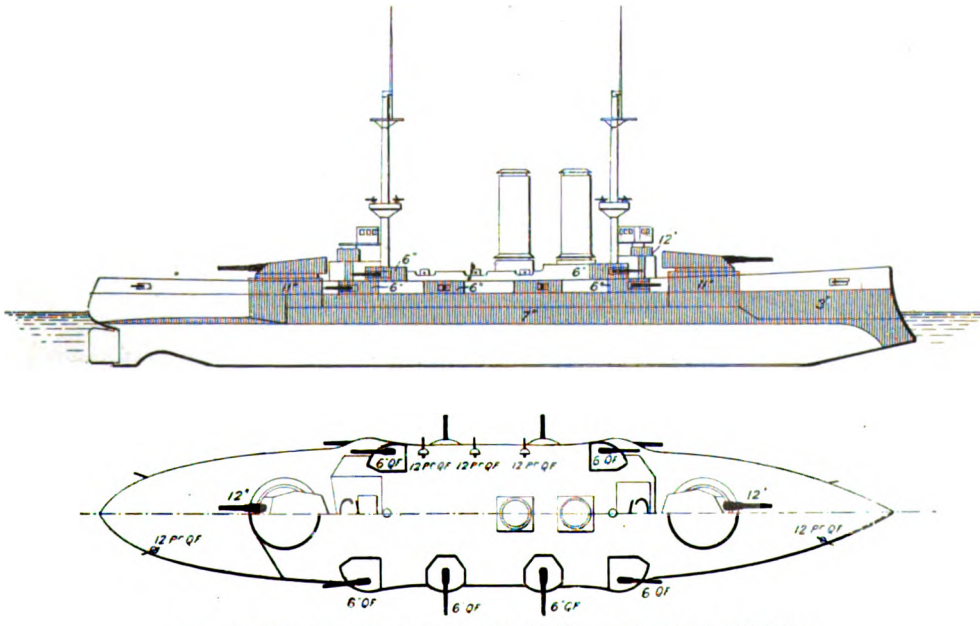
Triumph. **Swiftsure.**



Length, 436 ft. ; 11,800 tons ; Speed, 19·6 knots ; Completed, 1904 ;
Armament, 4—10 in., 14—7·5 in., 14—14 pr., 2—12 pr., 8 small.

See page 201.

Duncan. **Albemarle.** **Cornwallis.** **Exmouth.** **Russell.**



Length, 405 ft. ; 14,000 tons ; Speed, 18·6—19·3 knots ; Completed, 1903–1904 ;
Armament, 4—12 in., 12—6 in., 12—12 pr., 8 small.

See page 197.

PLATE 5.

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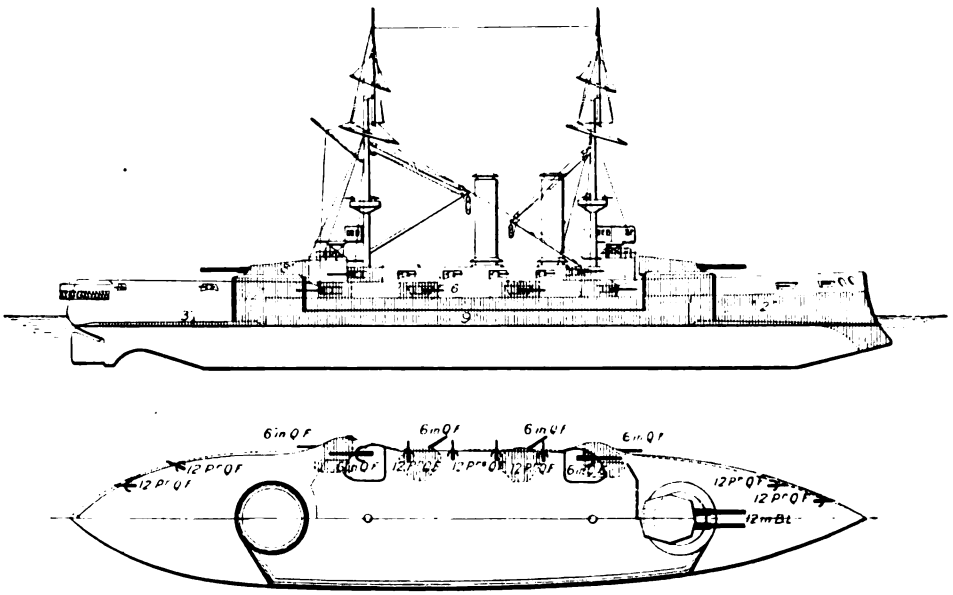
GREAT BRITAIN.

BATTLESHIPS.

Formidable. ***Bulwark.** ***Prince of Wales.** **Implacable.** ***Queen.** **Irresistible.** ***Venerable.** ***London.**

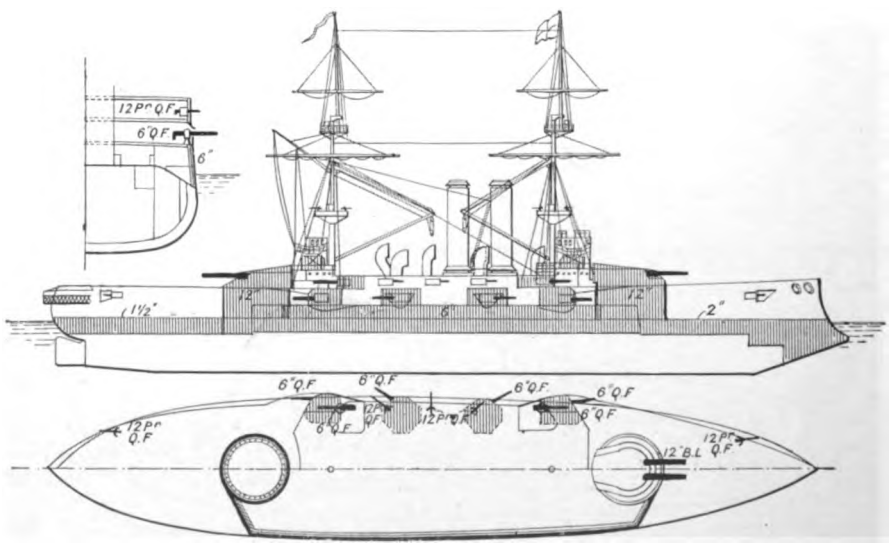


*In These Ships 9" Armour Tapers to 2" at 30 ft From Bow, & They Have no Forward Bulkhead

Length, 400 ft.; 15,000 tons; Speed, 18—18·3 knots; Completed, 1901-1904; Armament, 4—12 in., 12—6 in., 18—12 pr., 8 small.

See page 197.

Canopus. **Albion.** **Glory.** **Goliath.** **Ocean.** **Vengeance.**



Length, 390 ft.; 12,950 tons; Speed, 18·2—18·5 knots; Completed, 1900-1902; Armament, 4—12 in., 12—6 in., 12—12 pr., 8 small.

See page 195.

PLATE 6.

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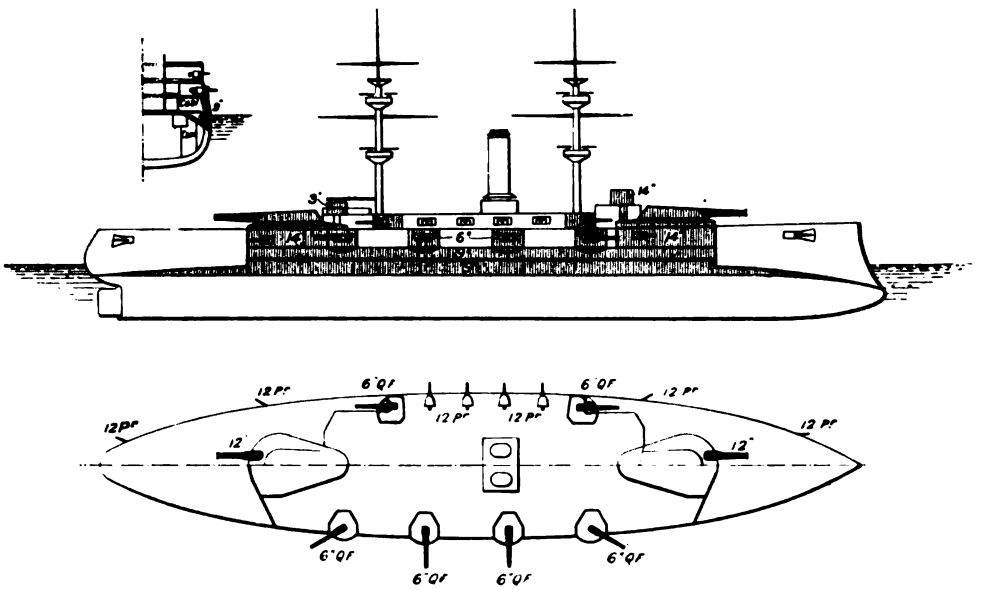
GREAT BRITAIN.

BATTLESHIPS.

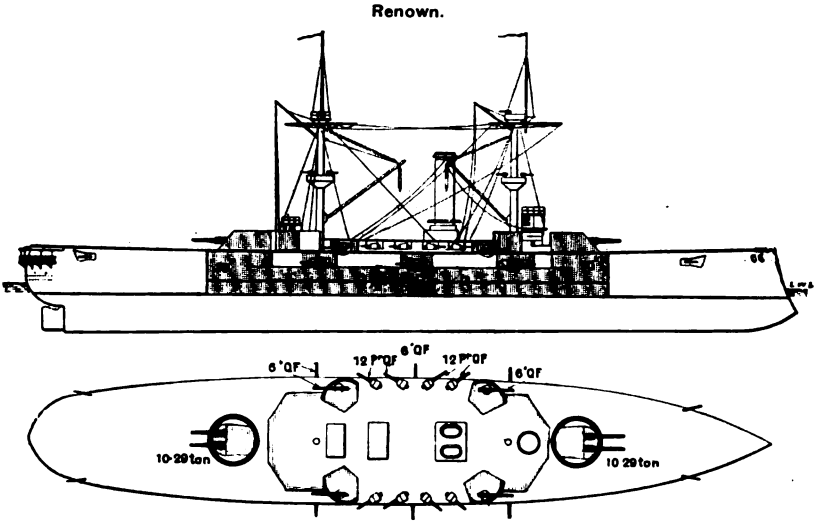
Majestic. **Cæsar.** **Hannibal.** **Illustrious.** **Jupiter.** **Magnificent.**
Mars. **Prince George.** **Victorious.**



Length, 390 ft.; 14,900 tons; Speed, 17·5 knots; Completed, 1895–1898;
Armament, 4—12 in., 12—6 in., 18—12 pr., 10 small.

See page 199.

Renown.



Length, 380 ft.; 12,350 tons; Speed, 18 knots; Completed, 1896;
Armament, 4—10 in., 10—6 in., 12—12 pr., 14 small.

See page 200.

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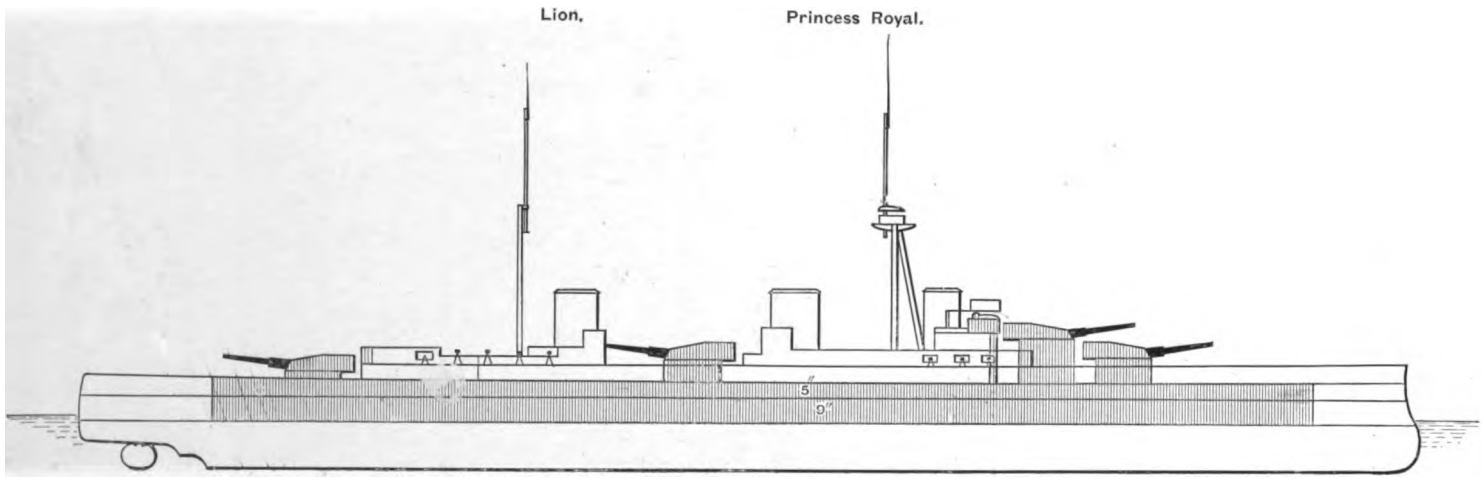
GREAT BRITAIN.

ARMOURED CRUISERS.



Length, 660 ft.; 26,350 tons; Speed, 28 knots; Building
Armament, 8—13·5 in., 16—4 in.

See page 199.

PLATE 8.

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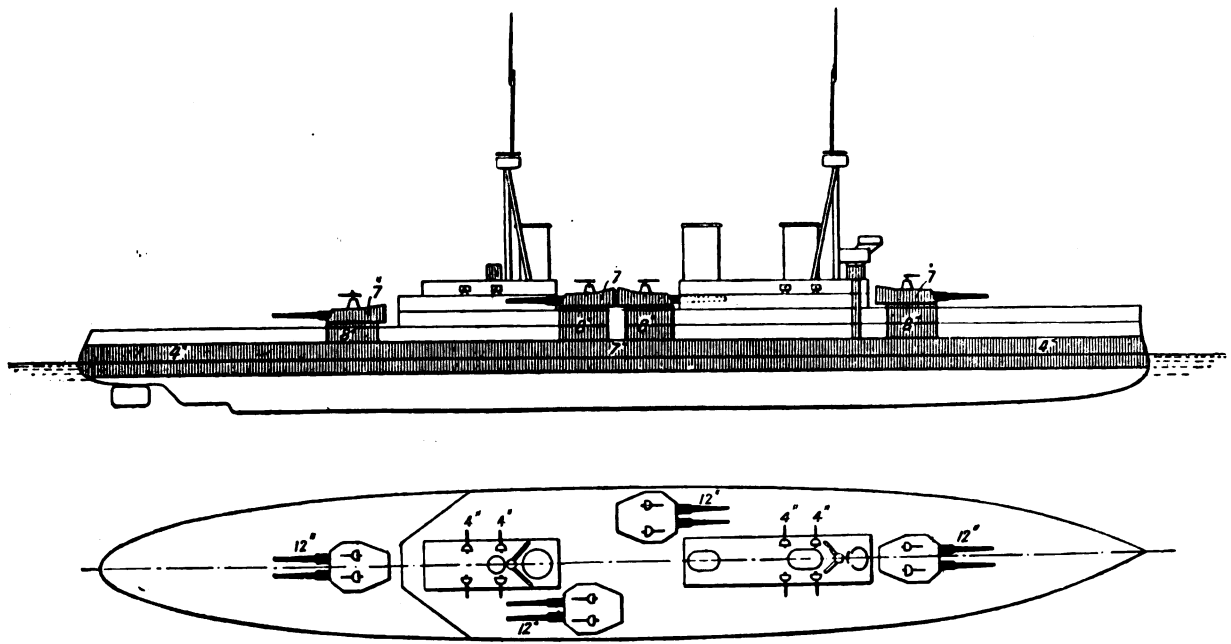
GREAT BRITAIN.

ARMOURED CRUISERS.

Invincible. **Indomitable.** **Inflexible.** **Indefatigable.***



Invincible
Indomitable
Inflexible } Length, 530 ft. ; 17,250 tons ; Speed, 26 knots ; Completed, 1908–9 ; Armament, 8—12 in., 16—4 in.

* **Indefatigable** : Length, 555 ft. ; 18,750 tons ; Speed, 25 knots ; Completed, 1911 ; Armament, 8—12 in., 16—4 in.

* The centre turrets are more *en échelon* than in the three earlier ships.

See page 198.

PLATE 9.

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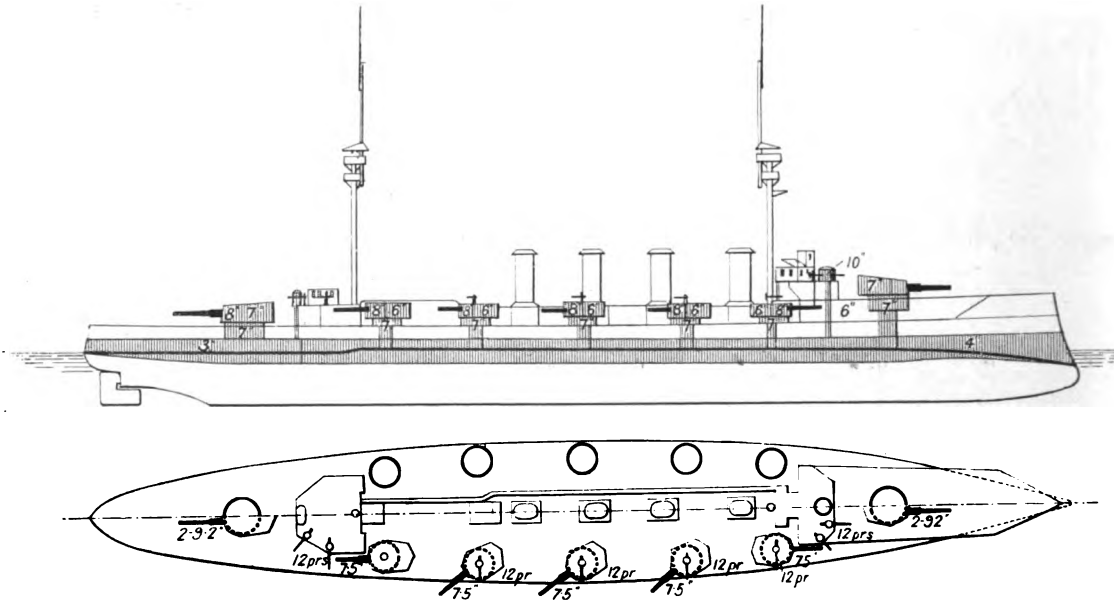
GREAT BRITAIN.

ARMOURED CRUISERS.

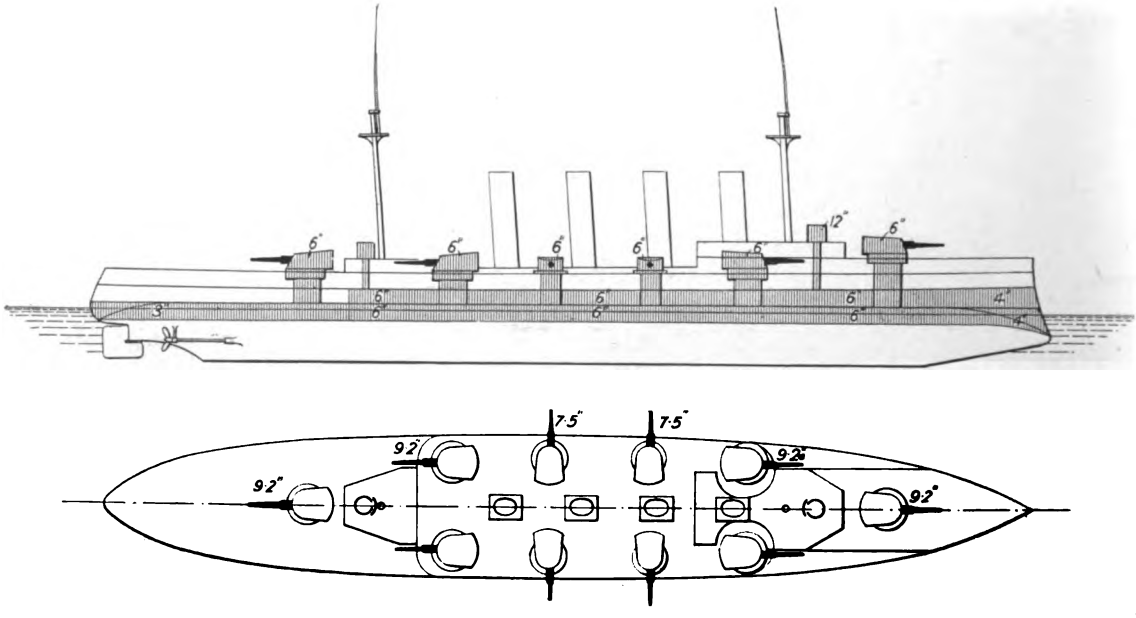
Defence. **Minotaur.** **Shannon.**



Length, 490 ft. ; 14,600 tons ; Speed, 22·5–23·5 knots ; Completed, 1907–1908 ;
Armament, 4—9·2 in., 10—7·5 in., 16—12 pr., 5 small.

See page 196.

Achilles. **Cochrane.** **Natal.** **Warrior.**



Length, 480 ft. ; 13,550 tons ; Speed, 22·3–23·3 knots ; Completed, 1906–1907 ;
Armament, 6—9·2 in., 4—7·5 in., 1—12 pr., 31 small.

See page 194.

PLATE 10.

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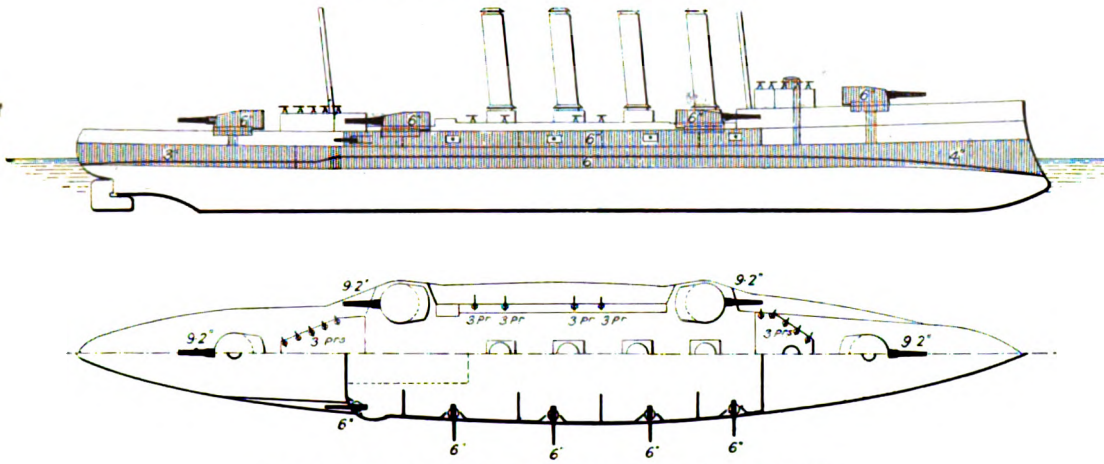
GREAT BRITAIN.

ARMOURED CRUISERS.

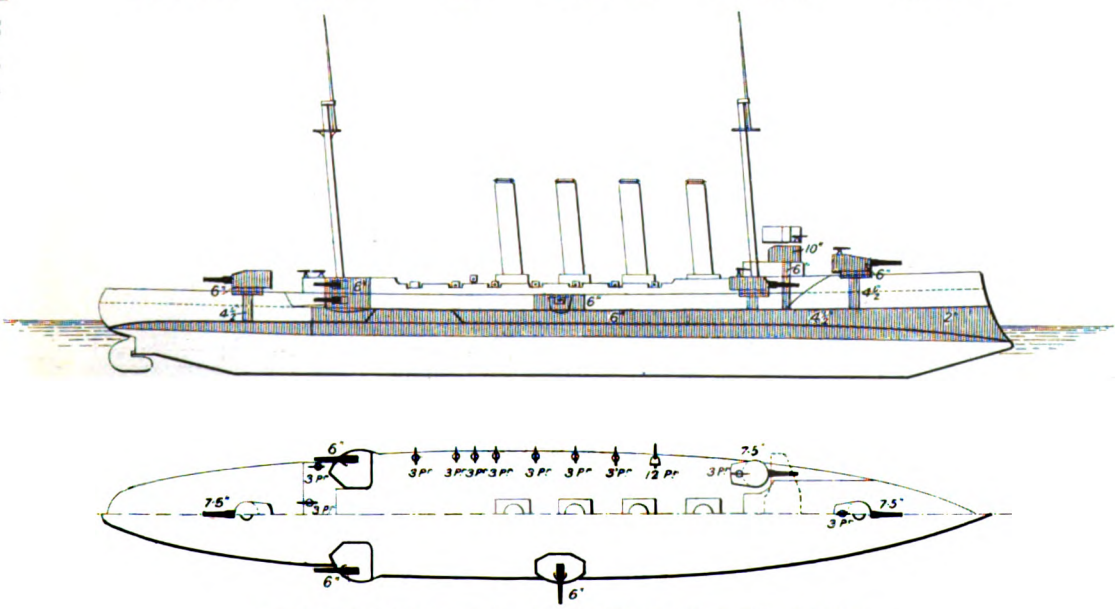
Black Prince. **Duke of Edinburgh.**



Length, 480 ft. ; 13,550 tons ; Speed, 22·8–23·6 knots ; Completed, 1906 ;
Armament, 6—9·2 in., 10—6 in., 2—12 pr., 27 small.

See page 195.

Devonshire. **Antrim.** **Argyll.** **Carnarvon.** **Hampshire.** **Roxburgh.**



Length, 450 ft. : 10,850 tons ; Speed, 22·2–23·6 knots ; Completed, 1905–1906 ;
Armament, 4—7·5 in., 6—6 in., 1—12 pr., 24 small.

See page 196.

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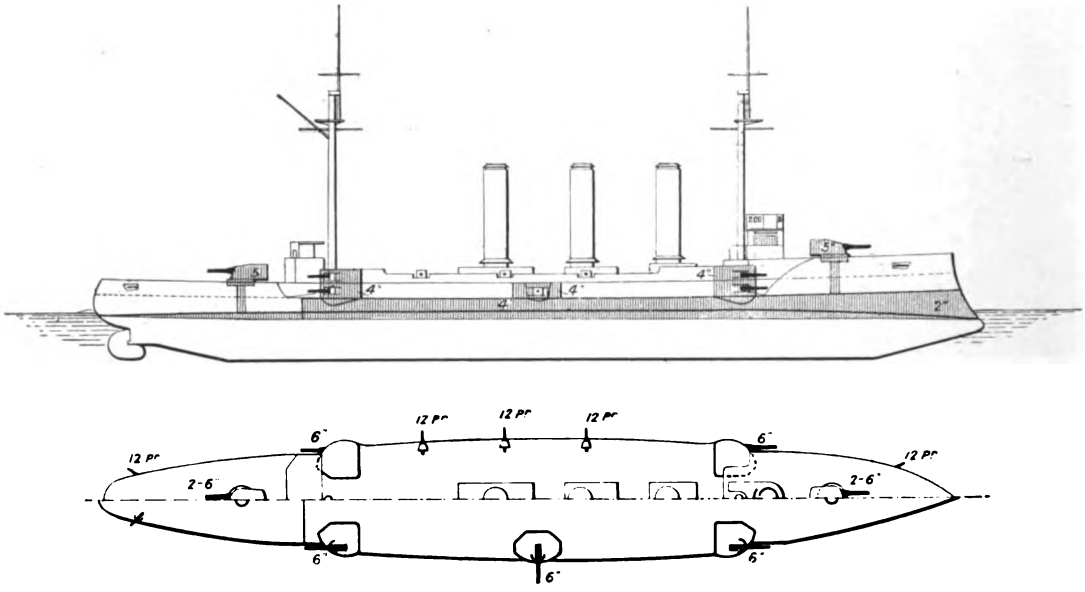
GREAT BRITAIN.

ARMOURED CRUISERS.

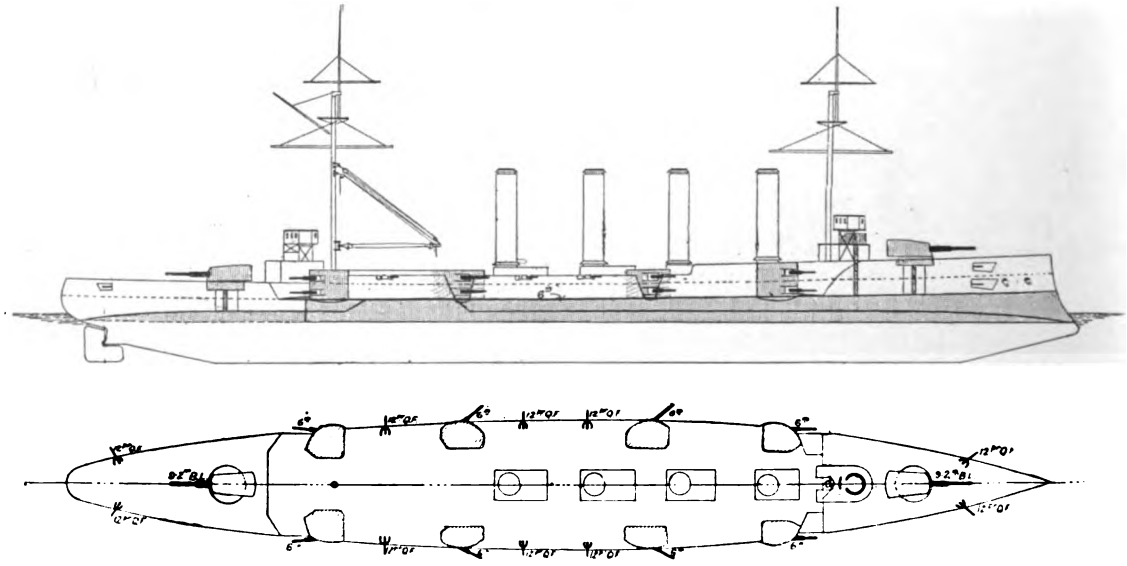
Berwick. Cornwall. Cumberland. Donegal. Essex.
Kent. Lancaster. Monmouth. Suffolk.



Length, 440 ft. ; 9,300 tons ; Speed, 22·7–24·7 knots ; Completed, 1903–1905 ;
Armament, 14—6 in., 10—12 pr., 9 small.

See page 195.

Drake. Good Hope. King Alfred. Leviathan.



Length, 500 ft. ; 14,100 tons ; Speed, 23·3–24·1 knots, ; Completed, 1902–1903 ;
Armament, 2—9·2 in., 16—6 in., 12—12 pr., 7 small.

See page 196.

PLATE 12.

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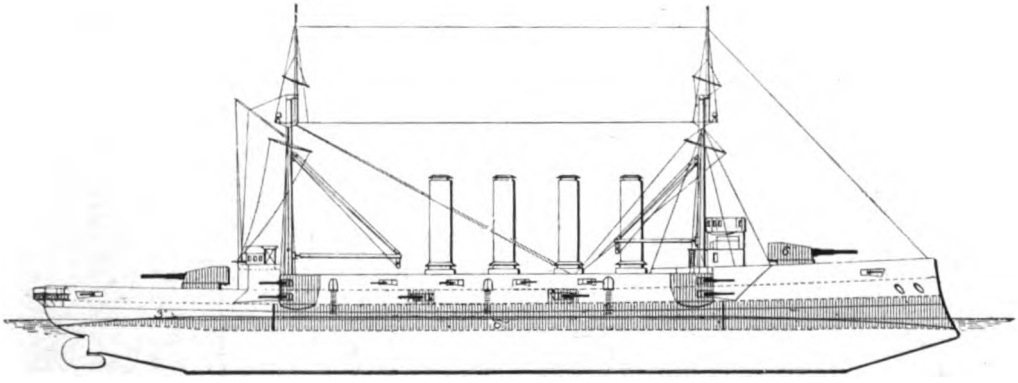
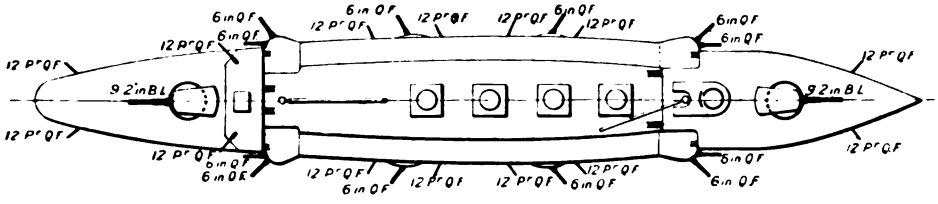
ARMOURED CRUISERS.

Cressy. **Aboukir.** **Bacchante.** **Euryalus.** **Hogue.** **Sutlej.**





Length, 440 ft. : 12,000 tons ; Speed, 20·8—21·8 knots ; Completed, 1901–1904 ;
Armament, 2—9·2 in., 12—6 in., 14—12 pr., 15 small.

See page 196.

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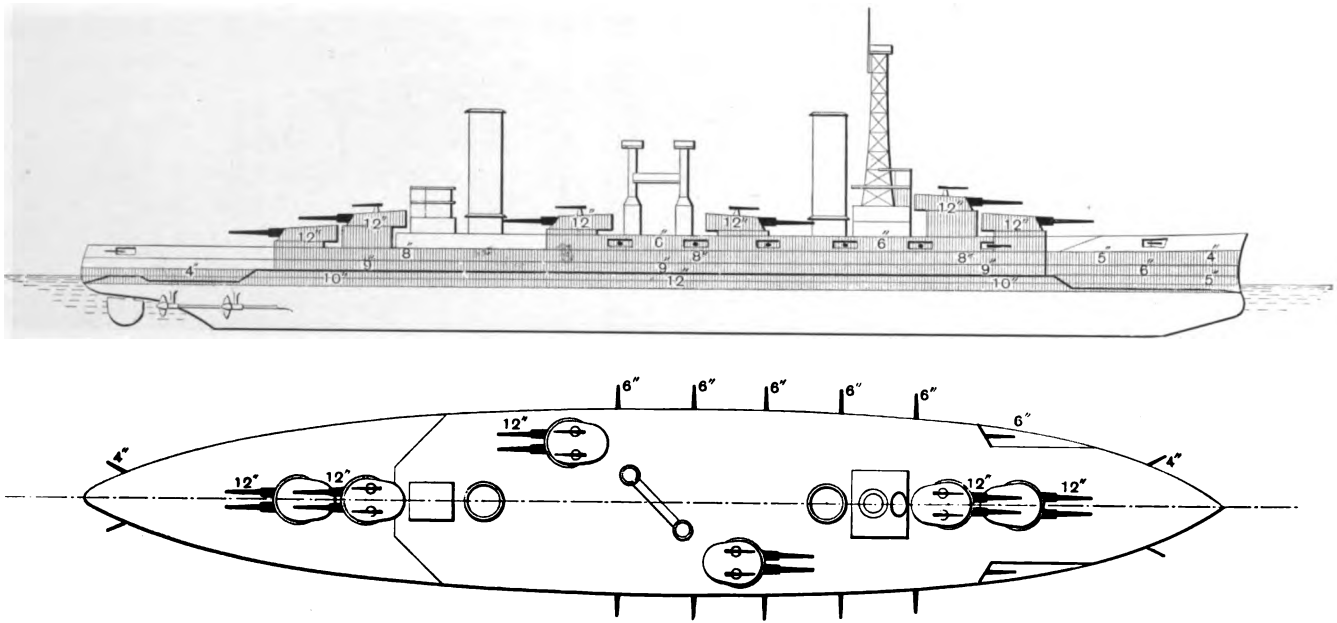
ARGENTINE.

BATTLESHIPS.

Moreno. **Rivadavia.**



Length, 578 ft. ; 28,000 tons ; Speed, 22·5 knots ; Building ;
Armament, 12—12 in., 12—6 in., 12—4 in.

See page 210.

PLATE 14.

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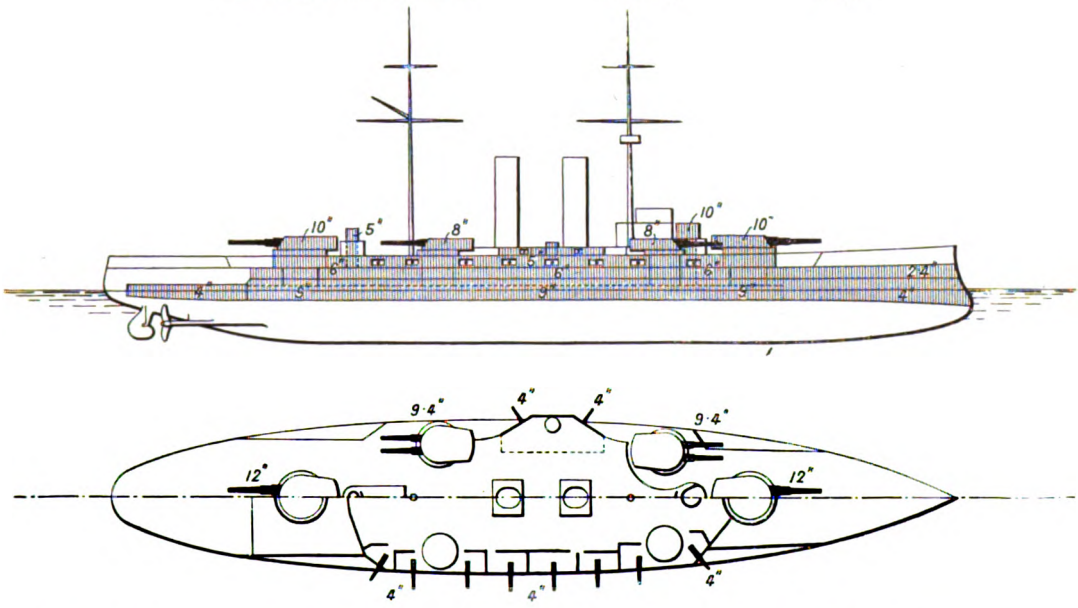
AUSTRIA.

BATTLESHIPS.

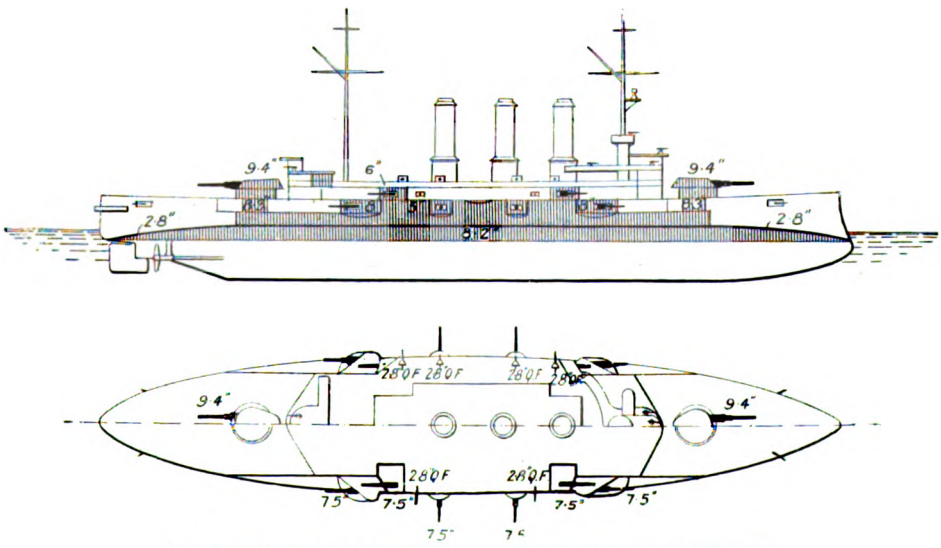
Erzherzog Franz Ferdinand. **Radetzky.** **Zrinyi.**



Length, 451 ft. ; 14,226 tons ; Speed, 20·5 knots ; Erzherzog Franz Ferdinand and Radetzky, Completed, 1910 ; Zrinyi, Building ; Armament, 4—12 in., 8—9·4 in., 20—4 in., 6—12 pr., 2 small.

See page 212.

Erzherzog Ferdinand Max. **Erzherzog Karl.** **Erzherzog Friedrich.**



Length, 390 ft. ; 10,433 tons ; Speed, 20–20·6 knots ; Completed, 1906–1907 ; Armament, 4—9·4 in., 12—7·5 in., 12—12 pr., 16 small.

See page 212.

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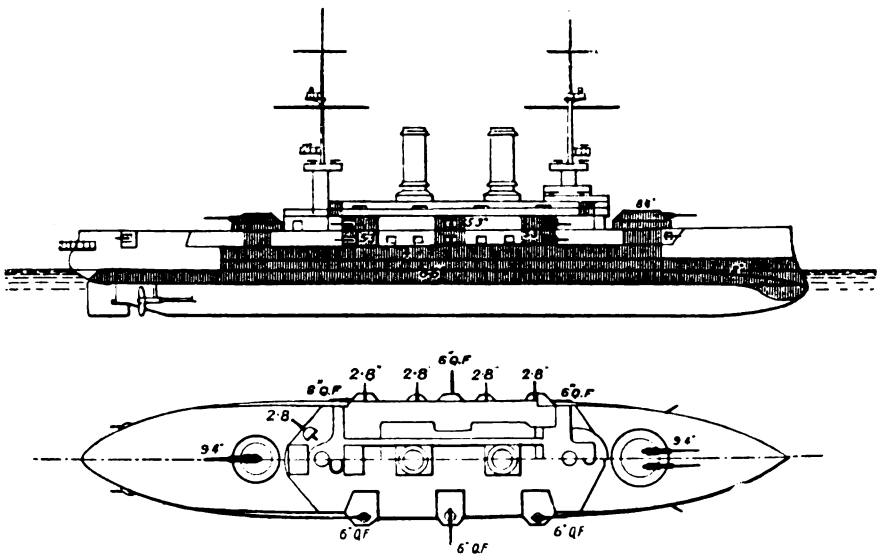
AUSTRIA.

BATTLESHIPS.

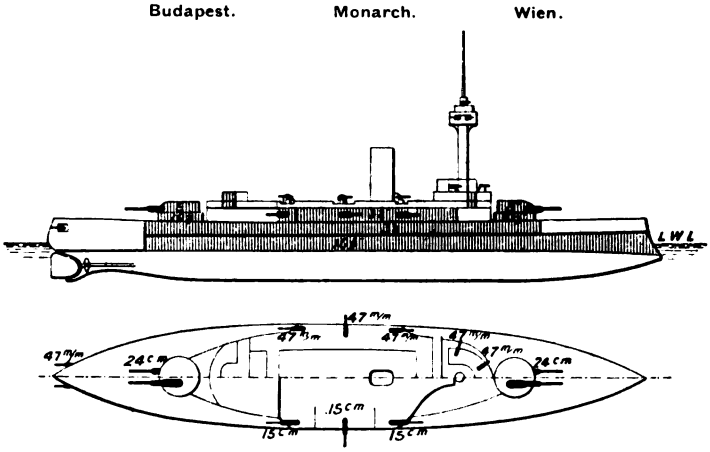
Arpad. **Babenberg.** **Habsburg.**



Length, 354 ft. : 8208 tons ; Speed, 19·6 knots ; Completed, 1902–1904 ; Armament, 3– 9·4 in., 12– 6 in., 10—12 pr., 10 small.

See page 212.

Budapest. **Monarch.** **Wien.**



Length, 305 ft. : 5462–5550 tons : Speed, 17·5 knots ; Completed, 1897–1898 ; Armament, 4—9·4 in., 6– 5·9 in., 20 small.

See page 212.

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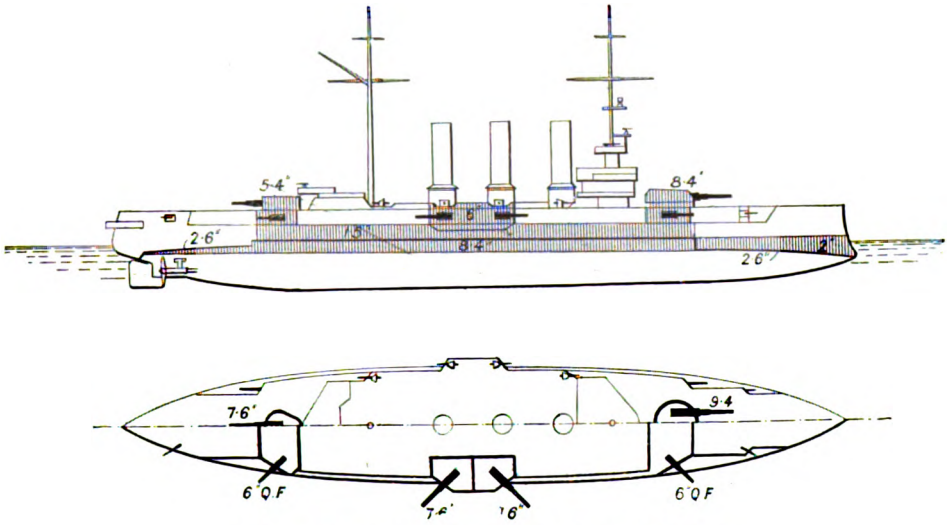
AUSTRIA.

ARMOURED CRUISERS.

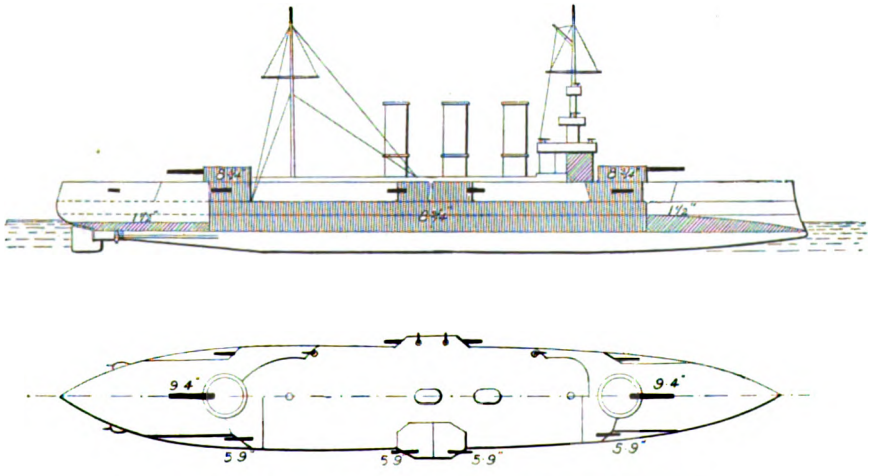
St. Georg.



Length, 384 ft. ; 7185 tons ; Speed, 22 knots ; Completed, 1906 ;
Armament, 2—9·4 in., 5—7·6 in., 4—6 in., 9—12 pr., 16 small.

See page 212.

Kaiser Karl VI.



Length, 367 ft. ; 6151 tons ; Speed, 20·7 knots ; Completed, 1900 ;
Armament, 2—9·4 in., 8—5·9 in., 22 small.

See page 212.

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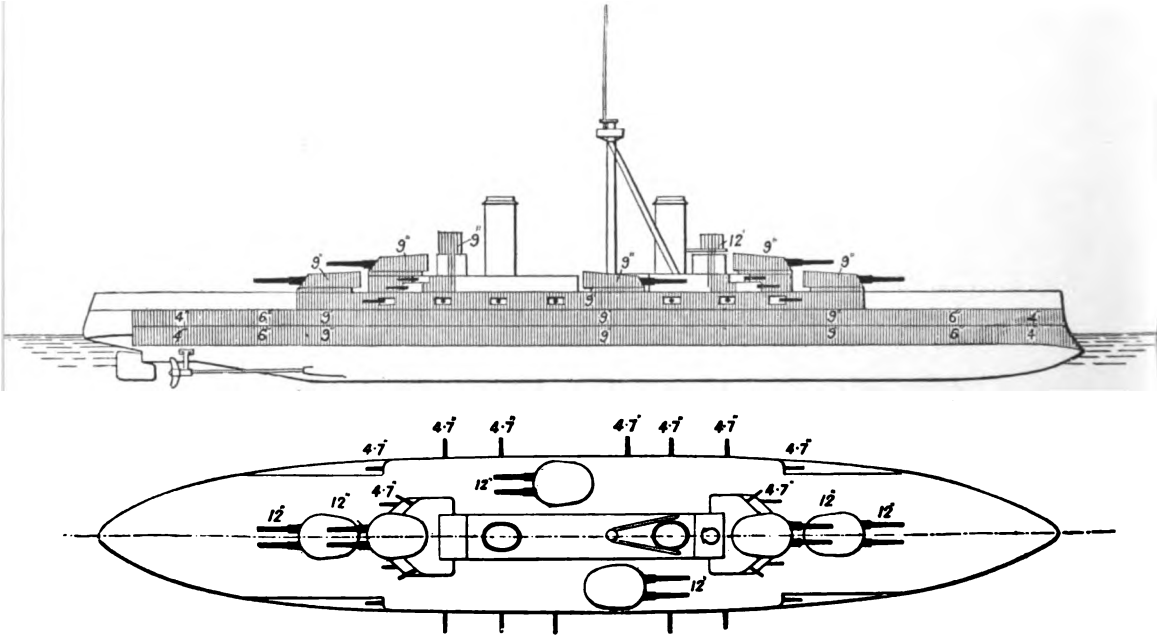
BRAZIL.

BATTLESHIPS.

Minas Geraes. **Rio de Janeiro.** **Sao Paulo.**



Length, 500 ft. ; 19,281 tons ; Speed, 21 knots ;
Minas Geraes, Completed, 1909 ; Sao Paulo, Completed, 1910 : Rio de Janeiro, Building ;
Armament, 12—12 in., 22—4·7 in., 8 small.

See page 214.

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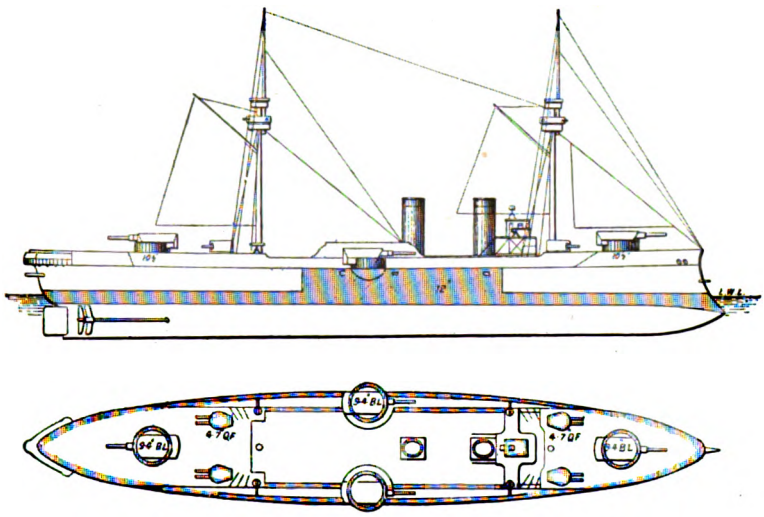
CHILI.

BATTLESHIP.

Capitão Prat.

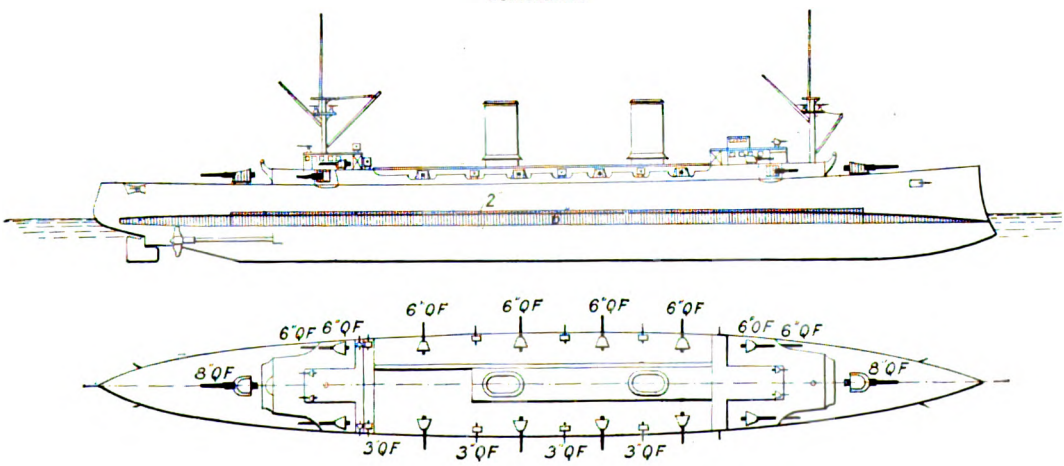


Length, 328 ft. ; 5981 tons ; Speed, 18·3 knots ; Completed, 1893 ;
Armament, 4—9·4 in., 8—4·7 in., 25 small.

See page 216.

ARMOURED CRUISER.

Esmeralda.



Length, 436 ft. ; 7020 tons ; Speed, 22·8 knots ; Completed, 1897 ;
Armament, 2—8 in., 16—6 in., 8—12 pr., 6 small.

See page 216.

PLATE 19.

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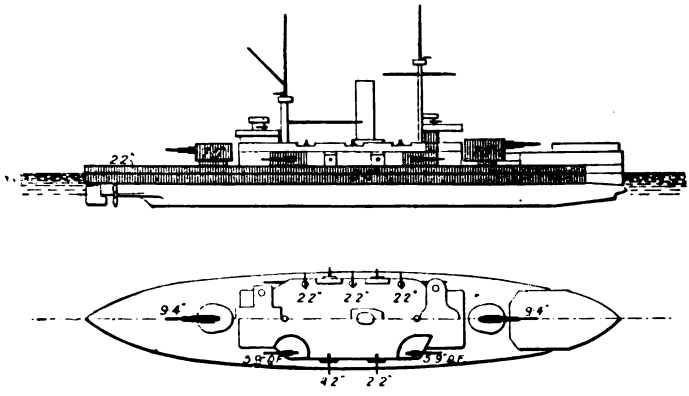
DENMARK.

COAST DEFENCE SHIPS.

Herluf Trolle. **Olfert Fischer.** **Peder Skram.**



Length, 271–274 ft. ; 3415–3543 tons ; Speed, 16–16·5 knots ; Completed, 1901–1910 ; Armament, 2—9·4 in., 4—5·9 in., 18 small.

See page 218.

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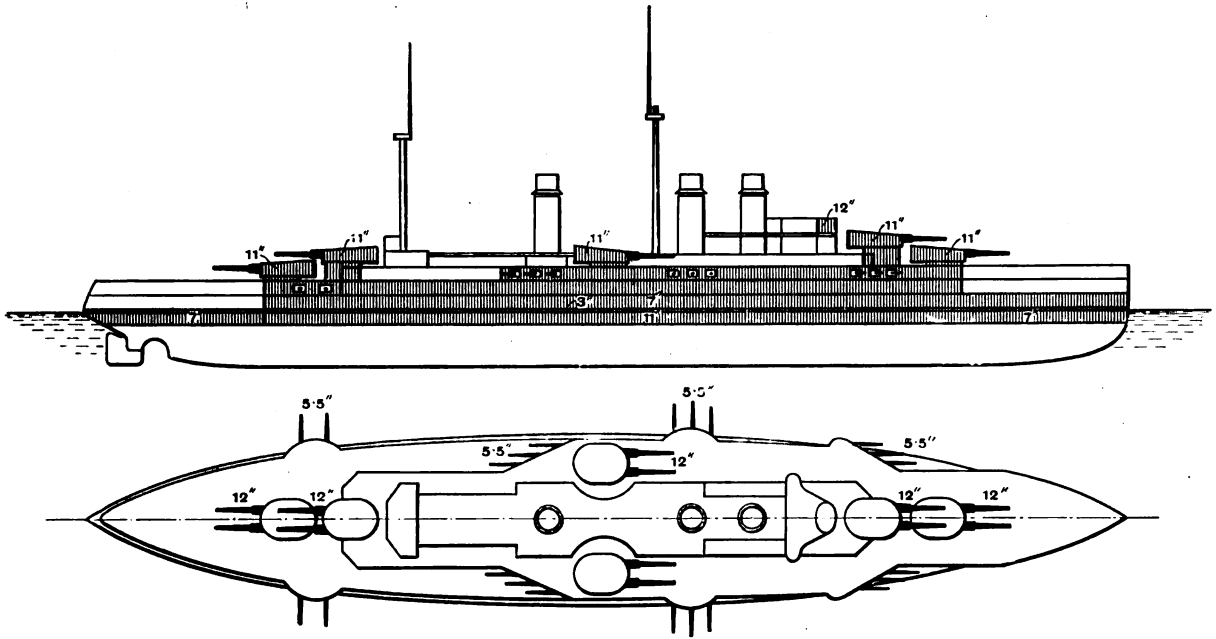
FRANCE.

BATTLESHIPS.

Jean Bart. **Courbet.**



Length, 541 ft.; 23,096 tons; Speed, 20 knots; Building.
Armament, 12—12 in., 22—5·5 in.

See page 220.

PLATE 21.

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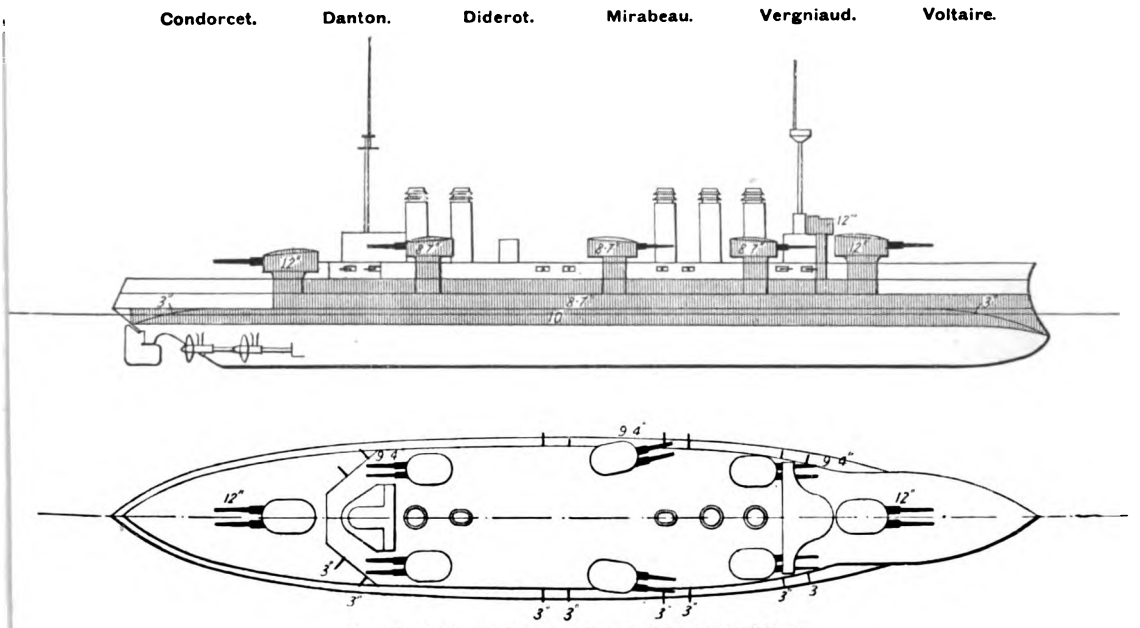
FRANCE.

BATTLESHIPS.

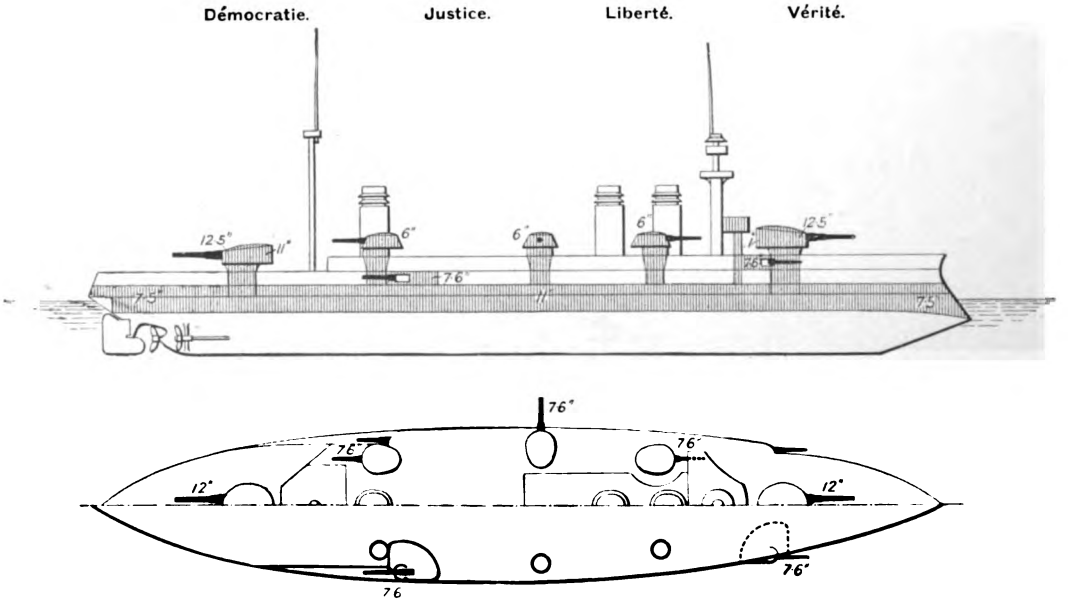
Condorcet. **Danton.** **Diderot.** **Mirabeau.** **Vergniaud.** **Voltaire.**



Length, 476 ft. ; 17,710 tons ; Speed, 19 knots ; Building ;
Armament, 4—12 in., 12—9·4 in., 16—12 pr., 10 small.

See page 219.

Démocratie. **Justice.** **Liberté.** **Vérité.**



Length, 439 ft. ; 14,635 tons ; Speed, 19·3 knots ; Completed, 1907–1908 ;
Armament, 4—12 in., 16—7·6 in., 28 small.

See page 219.

Plate 22.

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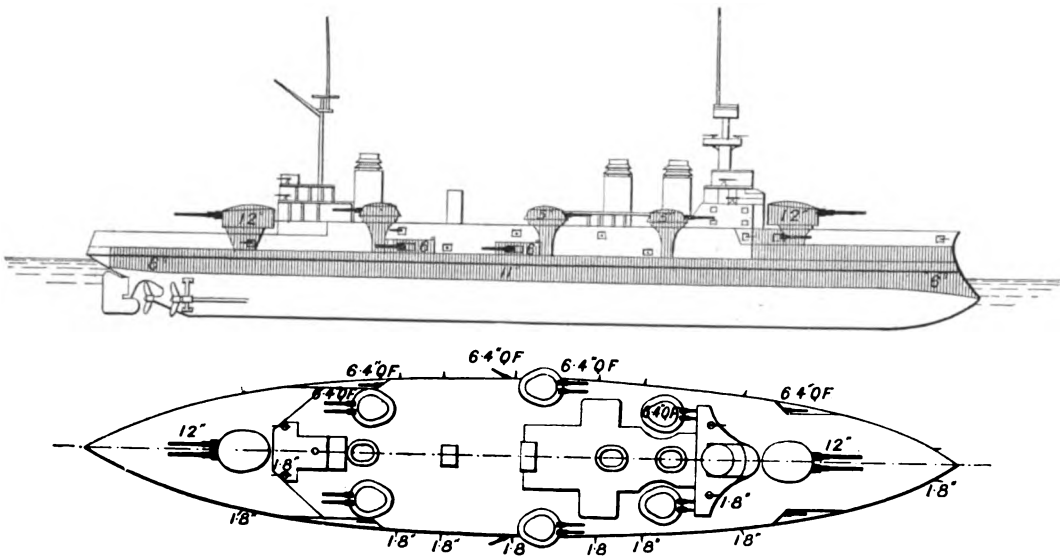
FRANCE.

BATTLESHIPS.

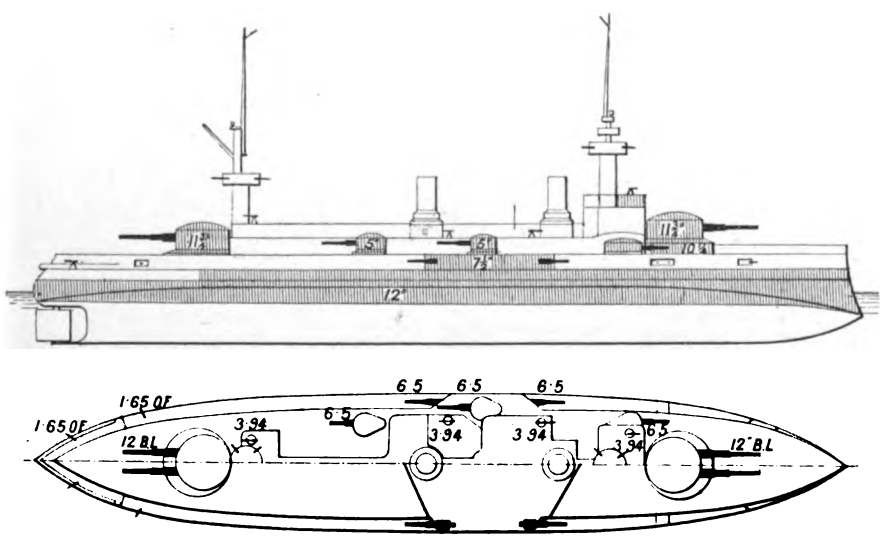
Patrie. République.



Length, 439 ft. ; 14,635 tons ; Speed, 19·1 knots ; Completed, 1906 ;
Armament, 4—12 in., 18–6·4 in., 28 small.

See page 221.

Suffren.



Length, 412 ft. ; 12,527 tons ; Speed, 18 knots ; Completed, 1903 ;
Armament, 4—12 in., 10—6·5 in., 8—3·9 in., 22 small.

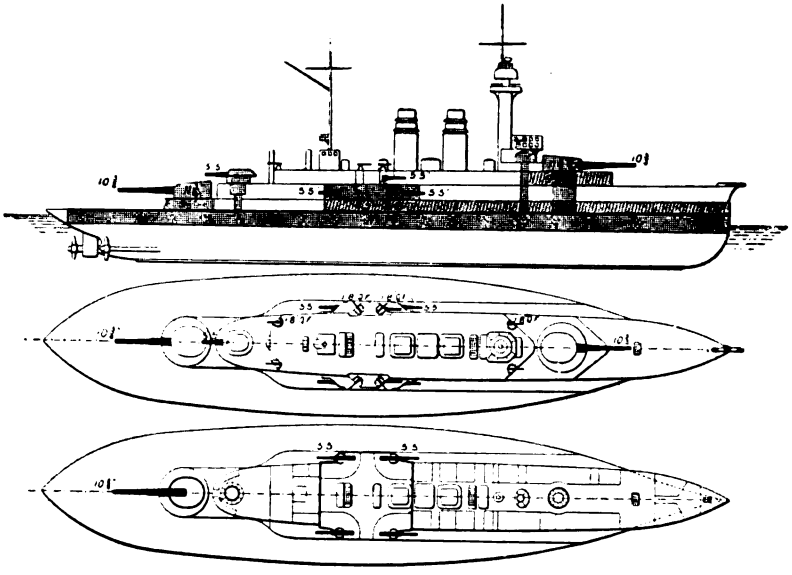
See page 222.

Digitized by Google

FRANCE.

BATTLESHIPS.

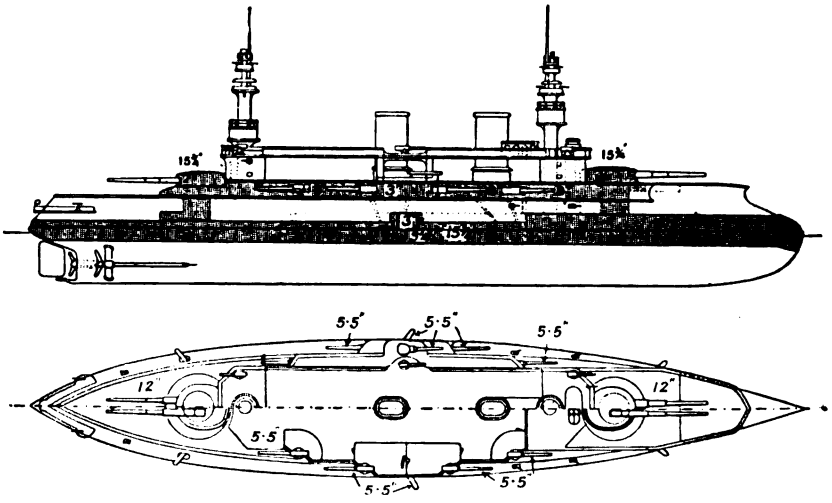
Henri IV.



Length, 354 ft. ; 8807 tons ; Speed, 17·2 knots ; Completed, 1903 ;
Armament, 2—10·8 in., 7—5·5 in., 14 small.

See page 220.

Charlemagne. Gaulois. St. Louis.



Length, 385 ft. ; 11,108 tons ; Speed, 18 knots ; Completed, 1898-1900 ;
Armament, 4—12 in., 10—5·5 in., 8—3·9 in., 34 small.

See page 219.

PLATE 24.

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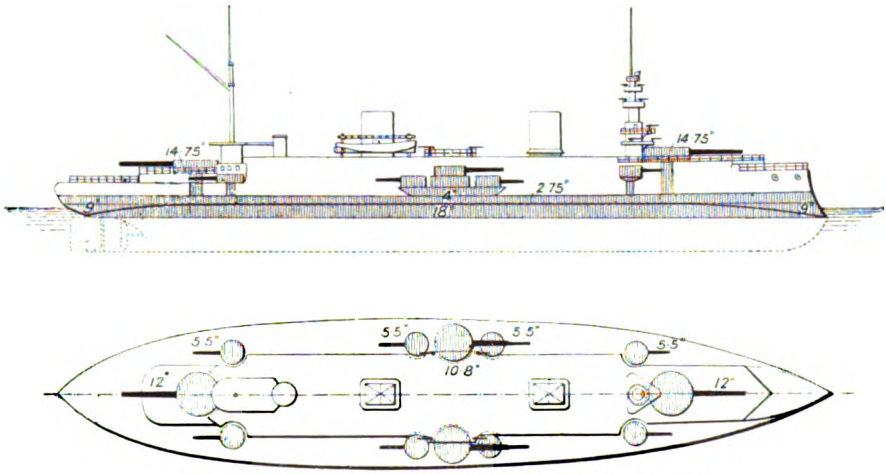
FRANCE.

BATTLESHIPS.

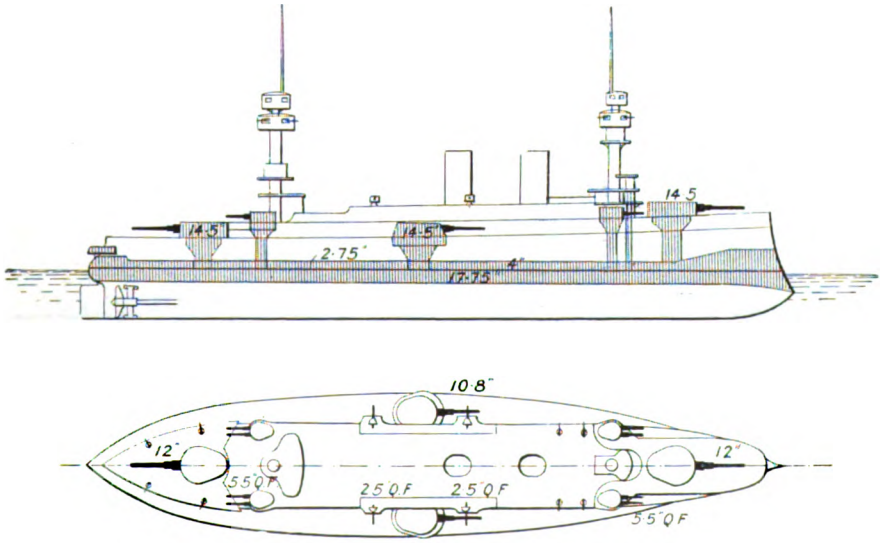
Carnot.



Length, 382 ft. ; 11,954 tons ; Speed, 17·8 knots ; Completed, 1896 ;
Armament, 2—12 in., 2—10·8 in., 8—5·5 in., 30 small.

See page 219.

Jauréguiberry.



Length, 364 ft. ; 11,637 tons ; Speed, 18 knots ; Completed, 1896 ;
Armament, 2—12 in., 2—10·8 in., 8—5·5 in., 32 small.

See page 220.

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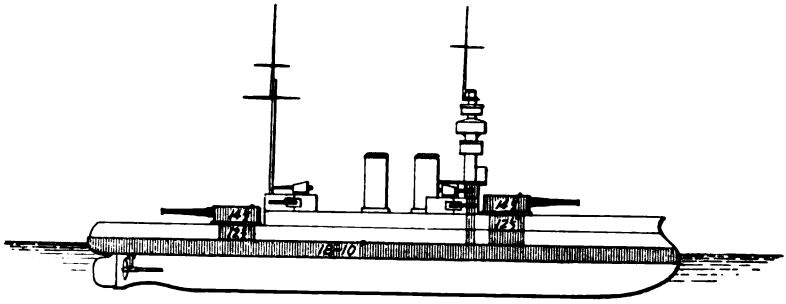
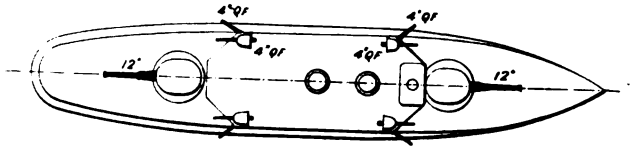
FRANCE.

BATTLESHIPS.

Bouvines. ***Tréhouart.**



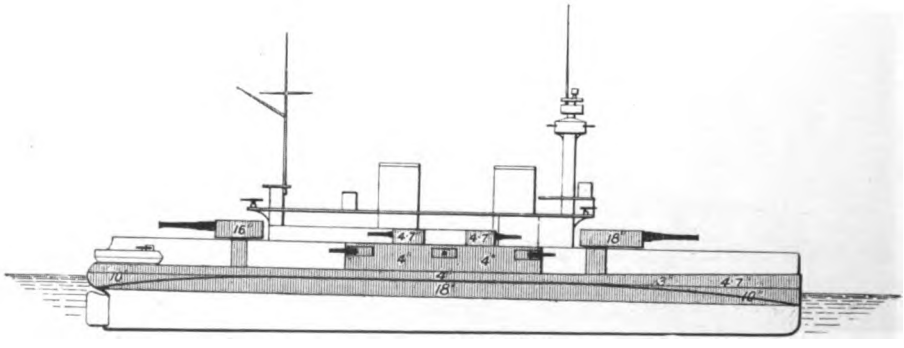


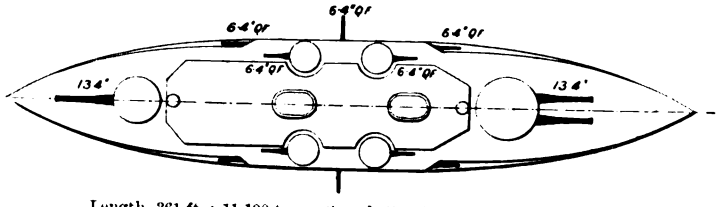
* The "Tréhouart" has but one funnel.

Length, 294 ft.; 6671–6691 tons; Speed, 15·7—16 knots; Completed, 1894–1896; Armament, 2—12 in., 8—4 in., 14 small.

See page 219.

Brennus.





Length, 361 ft.; 11,190 tons; Speed, 17·1 knots; Completed, 1895; Armament, 3—13·4 in., 10—6·4 in., 23 small.

See page 219.

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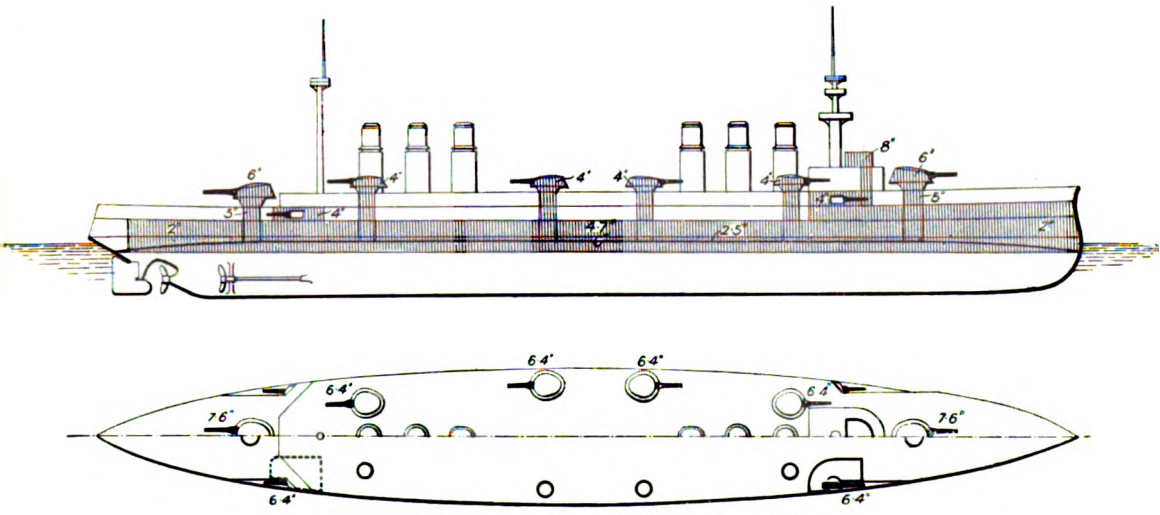
FRANCE.

ARMOURED CRUISERS.

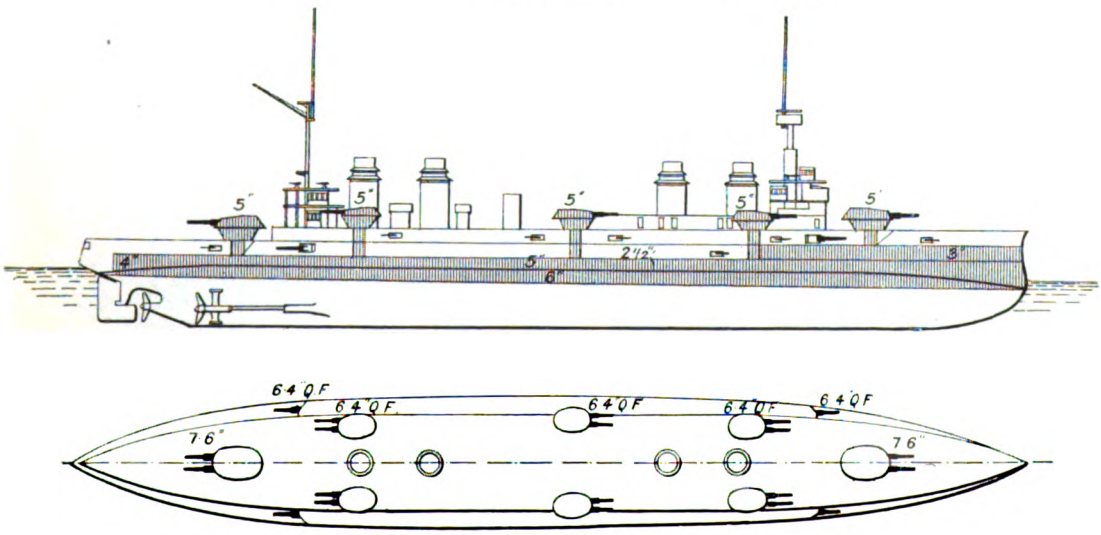
Ernest Renan.



Length, **515 ft.** ; 13,427 tons ; Speed, 24·2 knots ; Completed, 1909 ;
Armament, 4—7·6 in., 16—6·4 in., 24 small.

See page 220.

Jules Ferry. Léon Gambetta. Victor Hugo.



Length, **480 ft.** ; 12,351 tons ; Speed, 22·5–23 knots ; Completed, 1904–1906 ;
Armament, 4—7·6 in., 16—6·4 in., 24 small.

See page 221.

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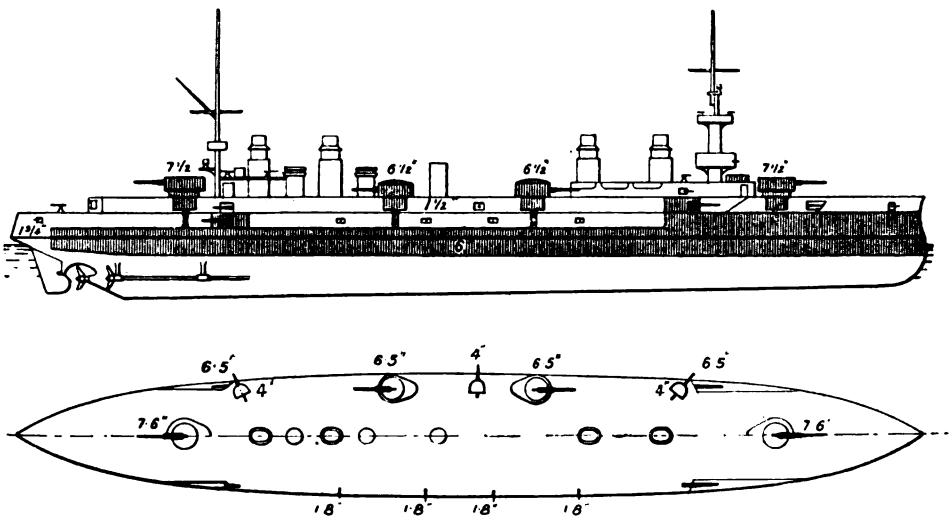
FRANCE.

ARMOURED CRUISERS.

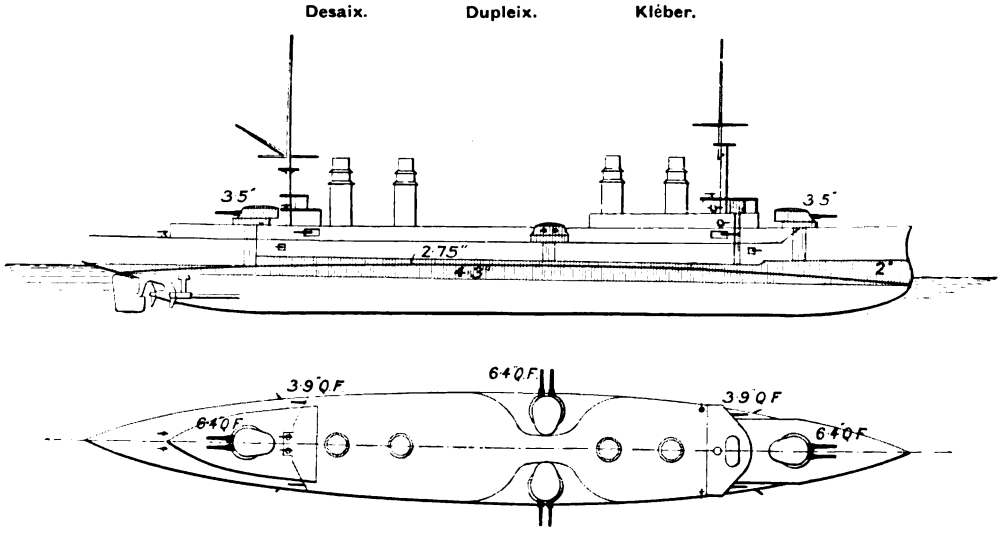
Aube. **Condé.** **Gloire.** **Marseillaise.**



Length, 453 ft. ; 9856 tons ; Speed, 21–21·9 knots ; Completed, 1903–1904 ;
Armament, 2—7·6 in., 8—6·4 in., 6—4 in., 20 small.

See page 219.

Desaix. **Dupleix.** **Kléber.**



Length, 426 ft. ; 7578 tons ; Speed, 21–21·7 knots ; Completed, 1903 ;
Armament, 8—6·4 in., 4—3·9 in., 14 small.

See page 220.

PLATE 28.

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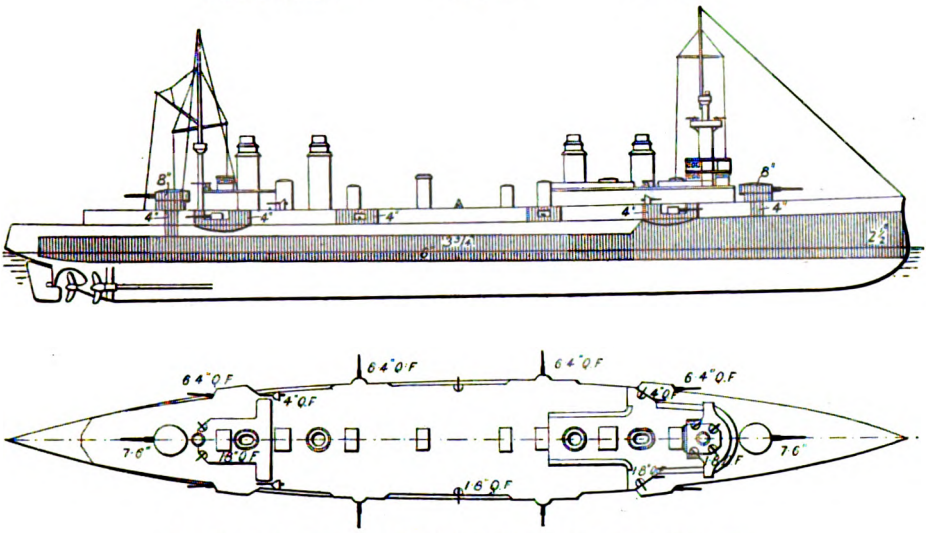
FRANCE.

ARMOURED CRUISERS.

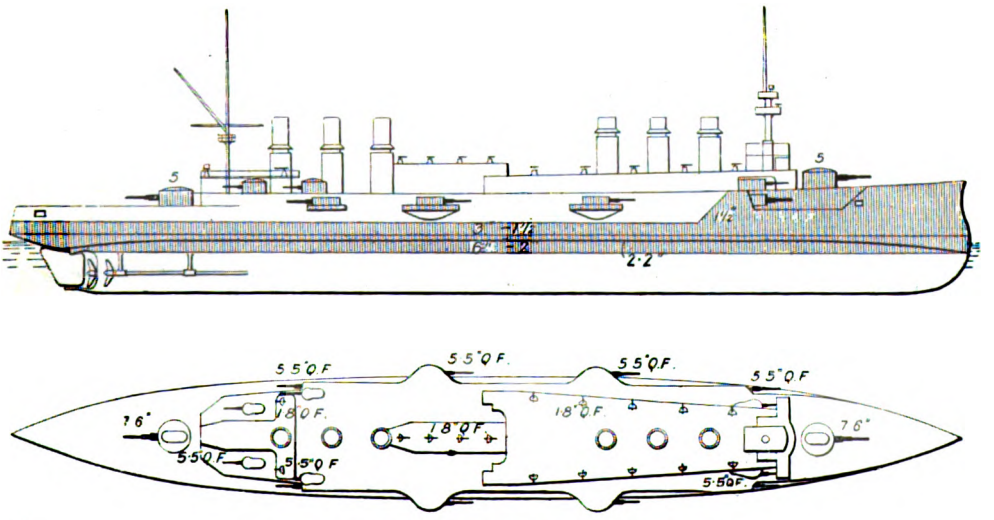
Dupetit-Thouars. **Gueydon.** **Montcalm.**



Length, 453 ft. ; 9367 tons ; Speed, 21–22·5 knots ; Completed, 1902–1905 ;
Armament, 2—7·6 in., 8 –6·4 in., 4—4 in., 22 small.

See page 220.

Jeanne d'Arc.



Length, 477 ft. ; 11,092 tons ; Speed, 21·7 knots ; Completed, 1903 ;
Armament, 2—7·6 in., 14—5·5 in., 26 small.

See page 220.

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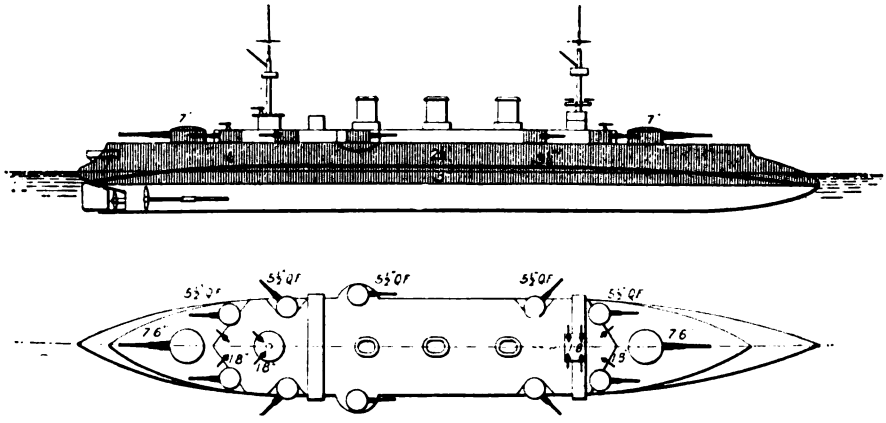
FRANCE.

ARMOURED CRUISER.

Pothuau.

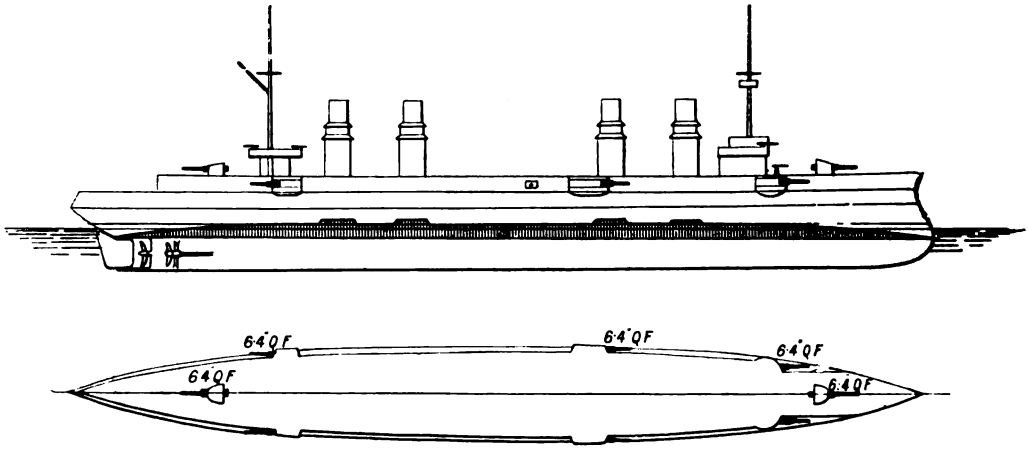


Length, 370 ft. ; 5374 tons ; Speed, 19·2 knots ; Completed, 1896 ;
Armament, 2 7·6 in., 10—5·5 in., 24 small.

See page 221.

CRUISER.

Jurien de la Gravière.



Length, 440 ft. ; 5595 tons ; Speed, 22·9 knots ; Completed, 1901 ;
Armament, 8—6·4 in., 12 small.

See page 224

PLATE 30.

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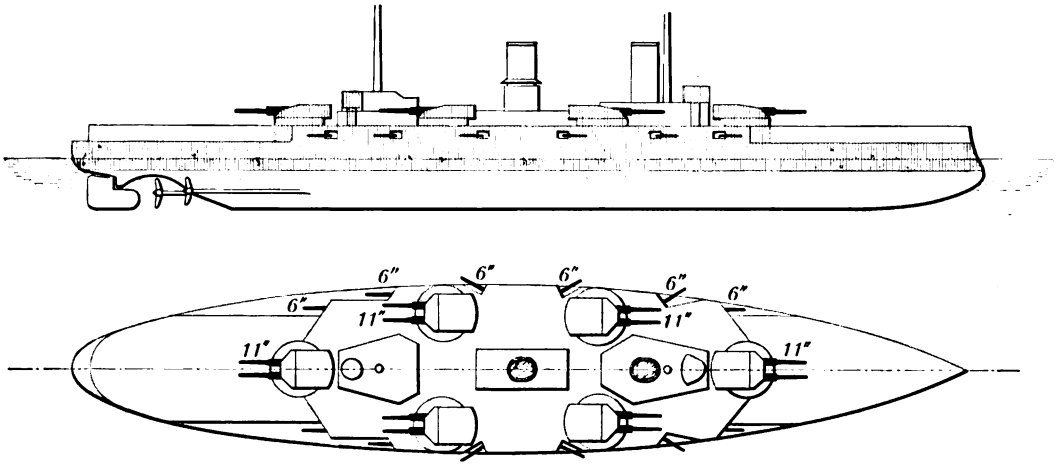
GERMANY.

BATTLESHIPS.

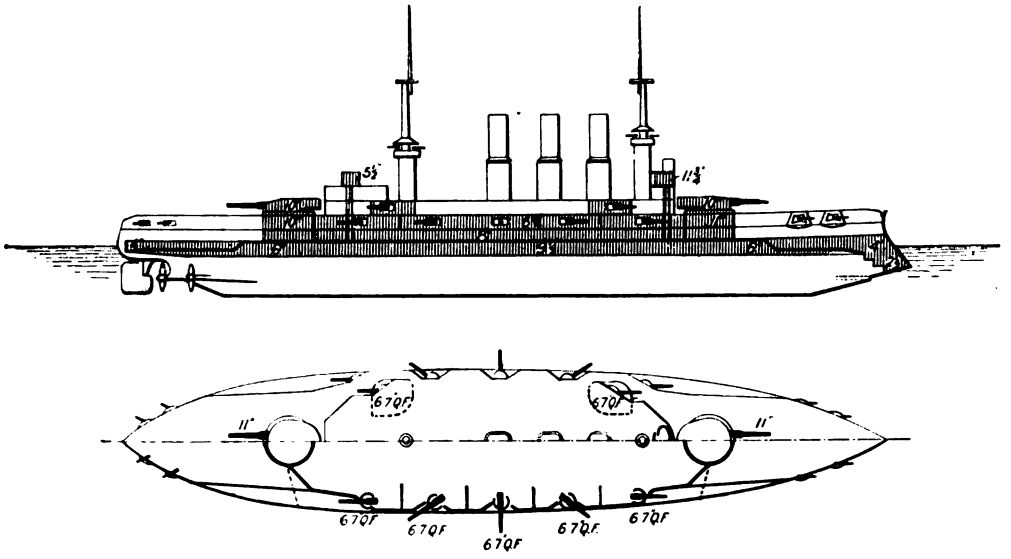
Nassau. **Posen.** **Rheinland.** **Westfalen.**



Length, 455 ft. ; 18,200 tons ; Speed, 20 knots ; Completed, 1909-1910 ;
Armament, 12—11 in., 12—6 in., 16—3·4 in.

See page 227.

Deutschland. **Hannover.** **Pommern.** **Schlesien.** **Schleswig-Holstein.**



Length, 398 ft. ; 13,040 tons ; Speed, 18·5—19·2 knots ; Completed, 1906-1909 ;
Armament, 4—11 in., 14—6·7 in., 22—3·4 in., 8 small.

See page 226.

PLATE 31.

d

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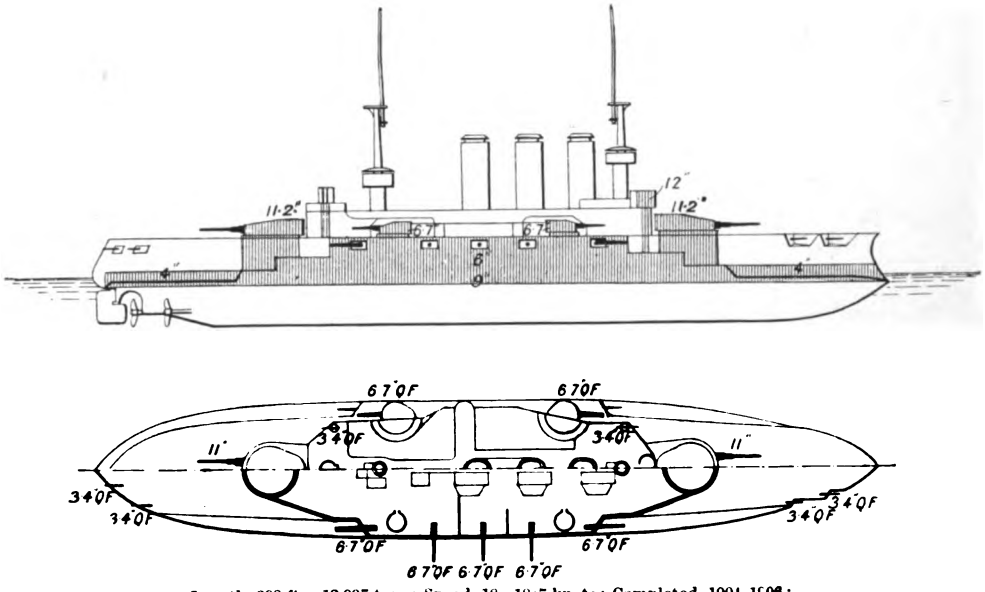
GERMANY.

BATTLESHIPS.

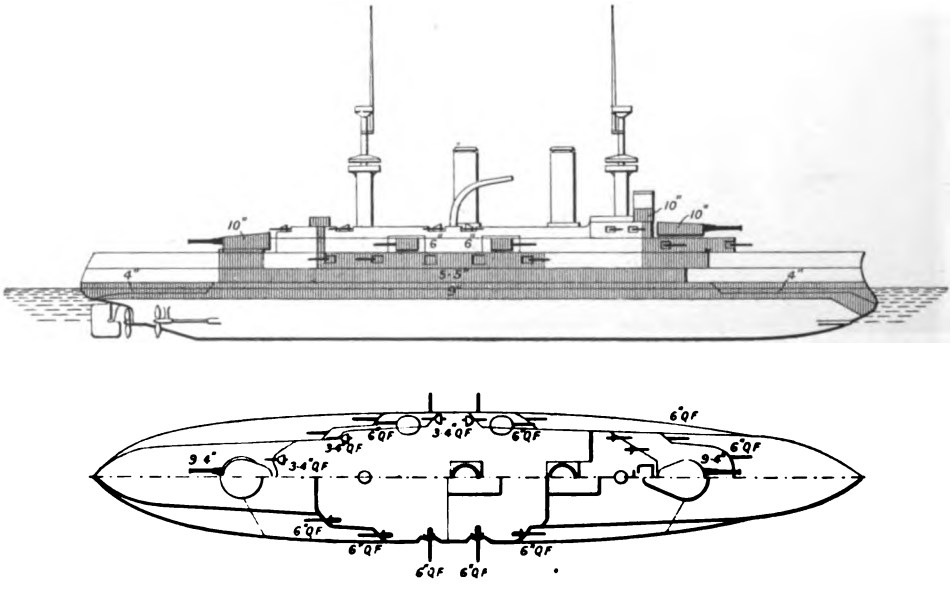
Braunschweig. **Elsass.** **Hessen.** **Lothringen.** **Preussen.**



Length, 398 ft. ; 12,997 tons ; Speed, 18—18·7 knots ; Completed, 1904–1906 ;
Armament, 4—11 in., 14—6·7 in., 12—3·4 in., 20 small.

See page 226.

Mecklenburg. **Schwaben.** **Wettin.** **Wittelsbach.** **Zähringen.**



Length, 394 ft. ; 11,643 tons ; Speed, 18—19 knots ; Completed, 1902–1903 ;
Armament, 4—9·4 in., 18—6 in., 12—3·4 in., 20 small.

See page 227

PLATE 32.

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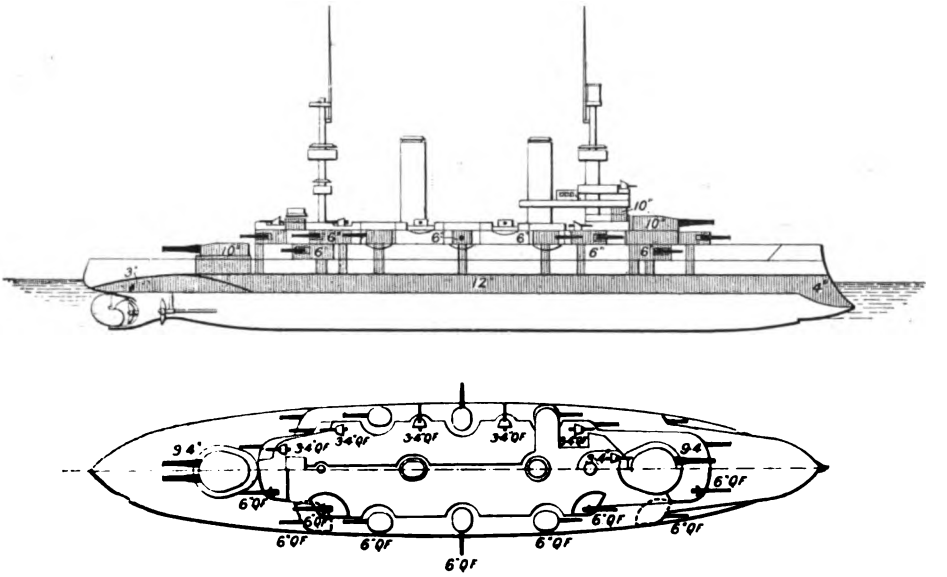
GERMANY.

BATTLESHIPS.

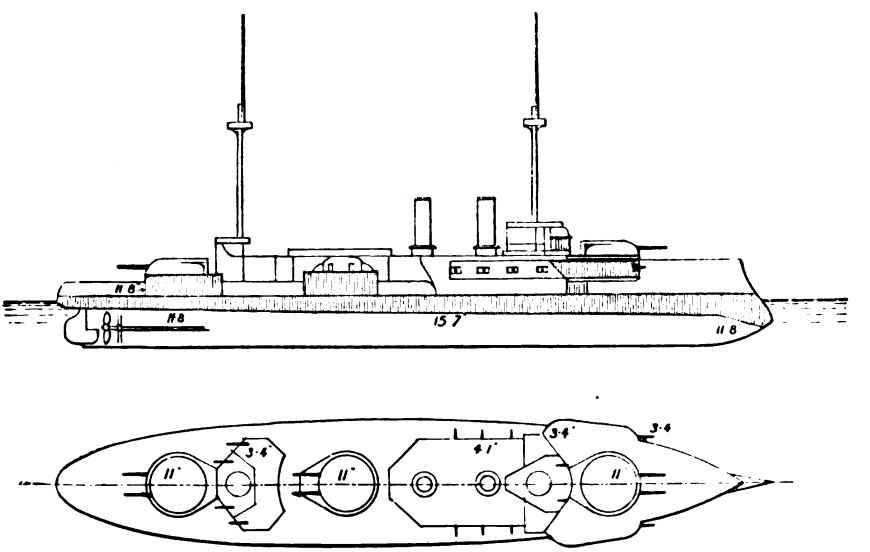
Kaiser Friedrich III. **Kaiser Karl der Grosse.** **Kaiser Wilhelm II.** **Kaiser Wilhelm der Grosse.**



Length, 377 ft. ; 10,974 tons ; Speed, 18 knots ; Completed, 1898–1901 ;
Armament, 4—9·4 in., 18—6 in., 12—3·4 in., 20 small.
NOTE.—Superstructure is being cut down.

See page 227.

Brandenburg. **Kürfurst Friedrich Wilhelm.** **Weissenburg.** **Wörth.**



Length, 354 ft. ; 9874 tons ; Speed, 16 –17·2 knots ; Completed, 1893-1894 ;
Armament, 6—11 in., 8—4·1 in., 8—3·4 in., 22 small.

See page 226.

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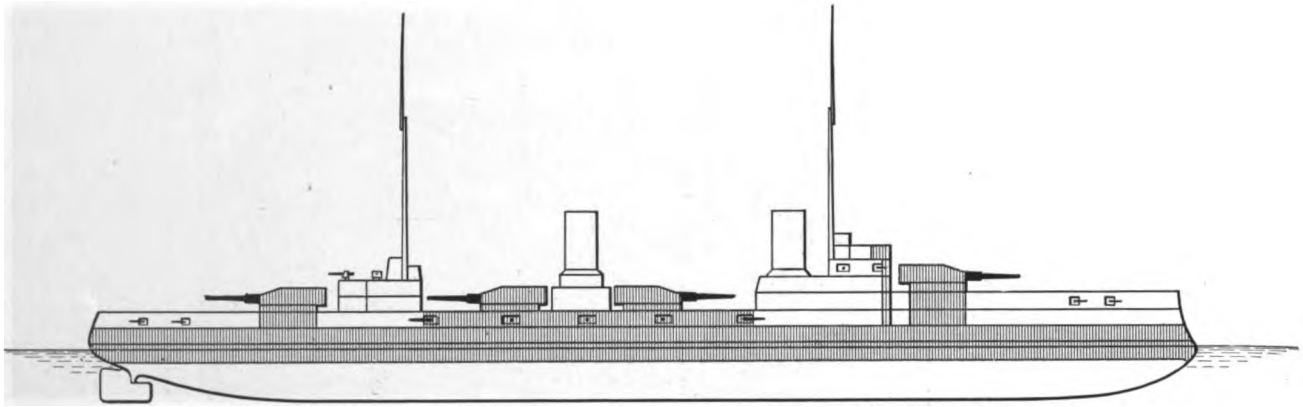
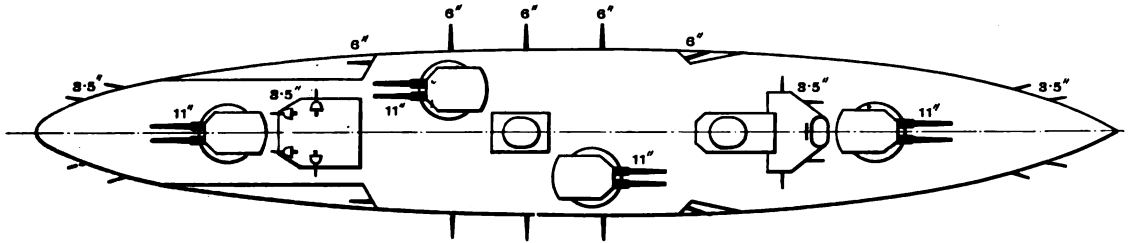
GERMANY.

ARMOURED CRUISER.

Von der Tann.





Length, 561 ft. ; 18,700 tons ; Speed, 27·6 knots ; Completed, 1911 ;
Armament, 8—11 in., 10—6 in., 16—3·5 in.

See page 228.

PLATE 34.

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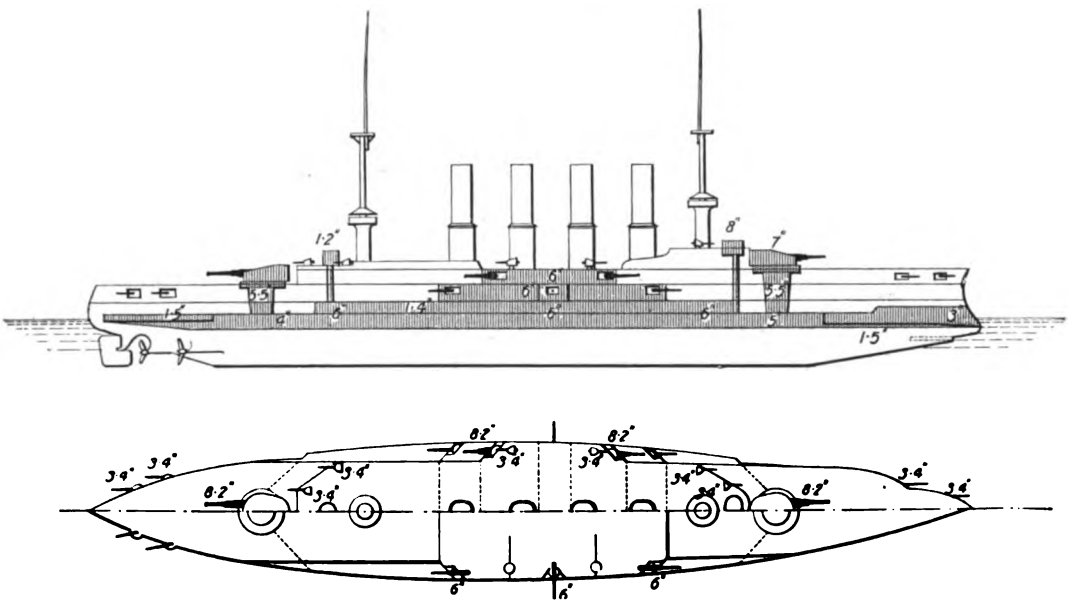
GERMANY.

ARMOURED CRUISERS.

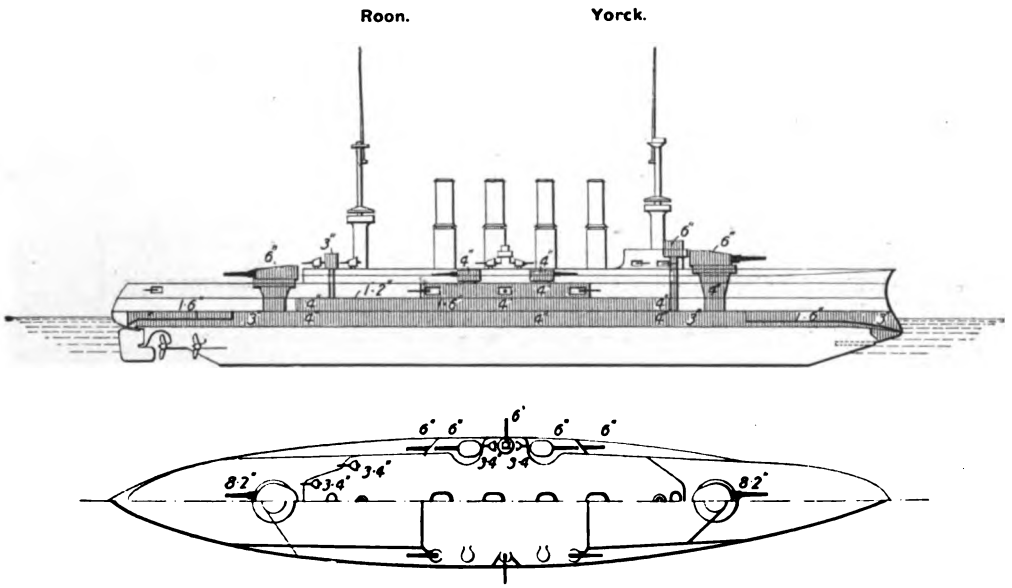
Gneisenau. **Scharnhorst.**



Length, 450 ft. ; 11,420 tons ; Speed, 22·5—23·8 knots ; Completed, 1908 ;
Armament, 8—8·2 in., 6—6 in., 20—3·4 in., 14 small.

See page 226.

Roon. **Yorck.**



Length, 403 ft. ; 9350 tons ; Speed, 21·1 knots ; Completed, 1905 ;
Armament. 4—8·2 in., 10—6 in., 16—3·4 in., 14 small.

See page 227.

PLATE 35.

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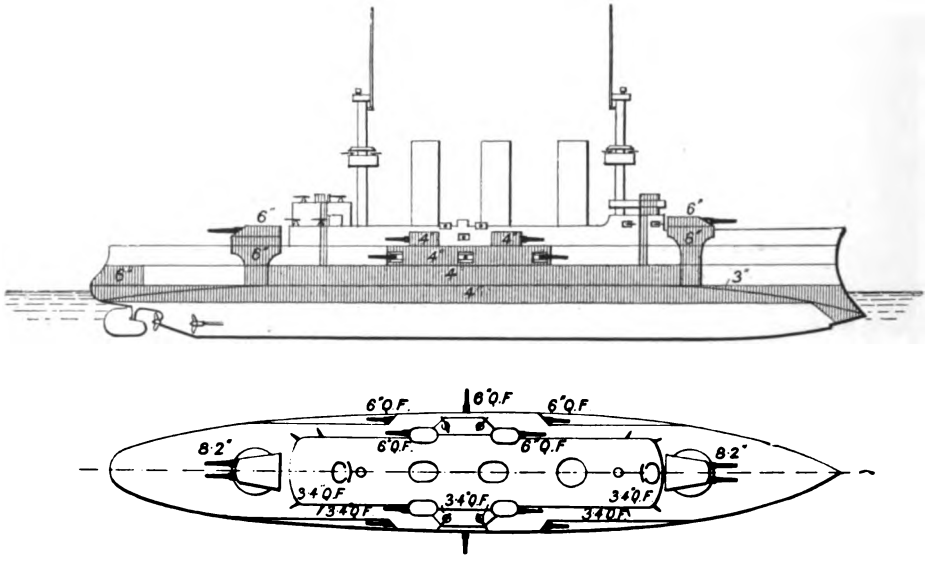
GERMANY.

ARMOURED CRUISERS.

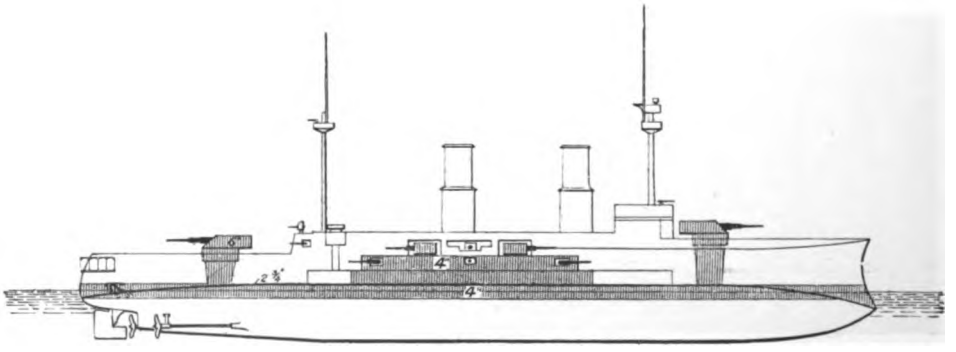
Prinz Adalbert. **Friedrich Karl.**

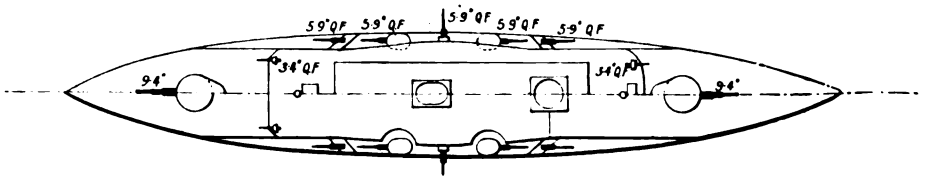


Length, 393 ft. ; 8878 tons ; Speed, 20·3—20·5 knots ; Completed, 1903–1904 ;
Armament, 4—8·2 in., 10—6 in., 12—3·4 in., 18 small.

See page 227.

Prinz Heinrich.





Length, 396 ft. ; 8759 tons ; Speed, 20 knots ; Completed, 1902 ;
Armament, 2—9·4 in., 10—5·9 in., 10—3·4 in., 14 small.

See page 227.

PLATE 36.

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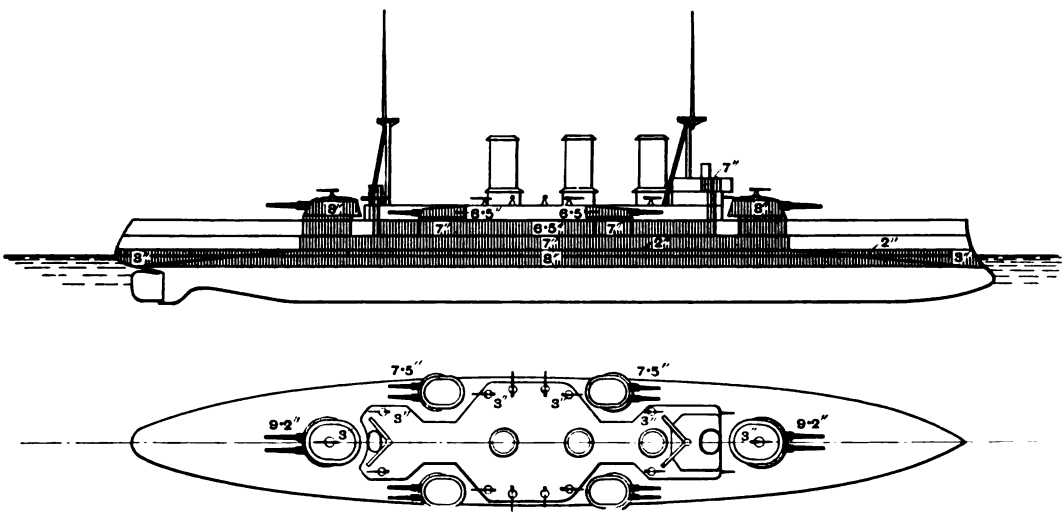
GREECE.

ARMOURED CRUISER.

Giorgios Averoff.



Length, 430 ft. ; 9956 tons ; Speed, 24 knots ; Completed, 1911.
Armament, 4—9·2 in., 8—7·5 in., 10—3 in.

See page 233.

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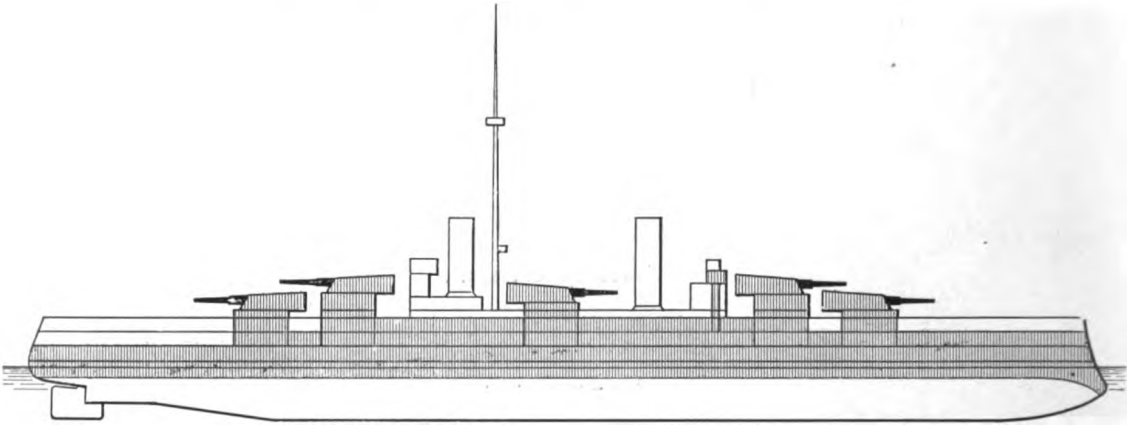
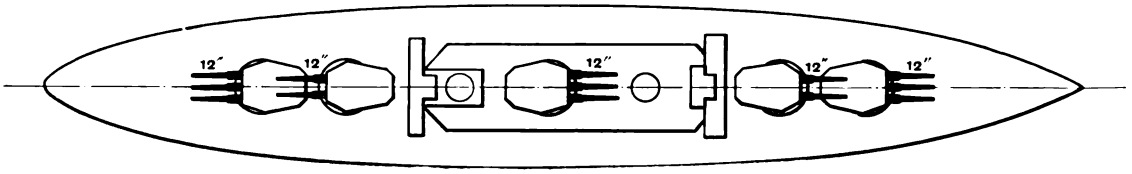
ITALY.

BATTLESHIPS.

Conte di Cavour. **Giulio Cesare.** **Leonardo da Vinci.**

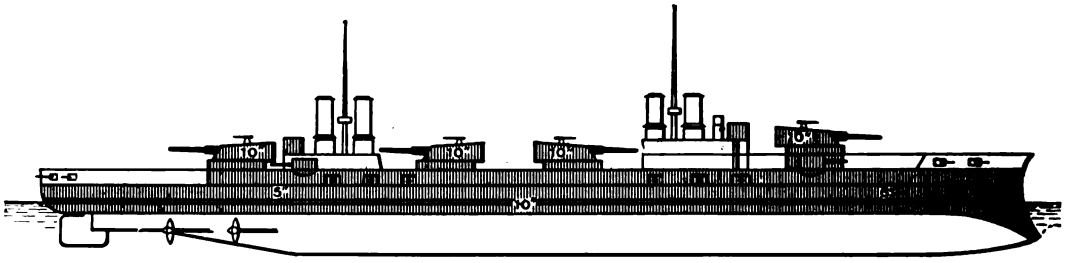


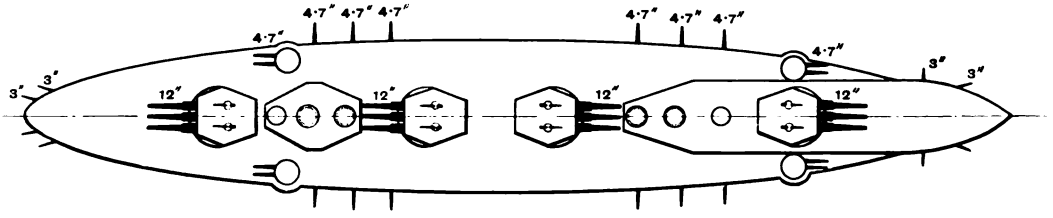


Length, 492 ft. ; 21,500 tons ; Speed, 23·5 knots ; Building ;
Armament, 13—12 in., 18—4·7 in.
N.B.—Arrangement of armour uncertain.

See page 234.

Dante Alighieri.





Length, 505 ft. ; 18,300 tons ; Speed, 23 knots ; Building ;
Armament, 12—12 in., 20—4·7 in., 16—3 in.

See page 234.

PLATE 38.

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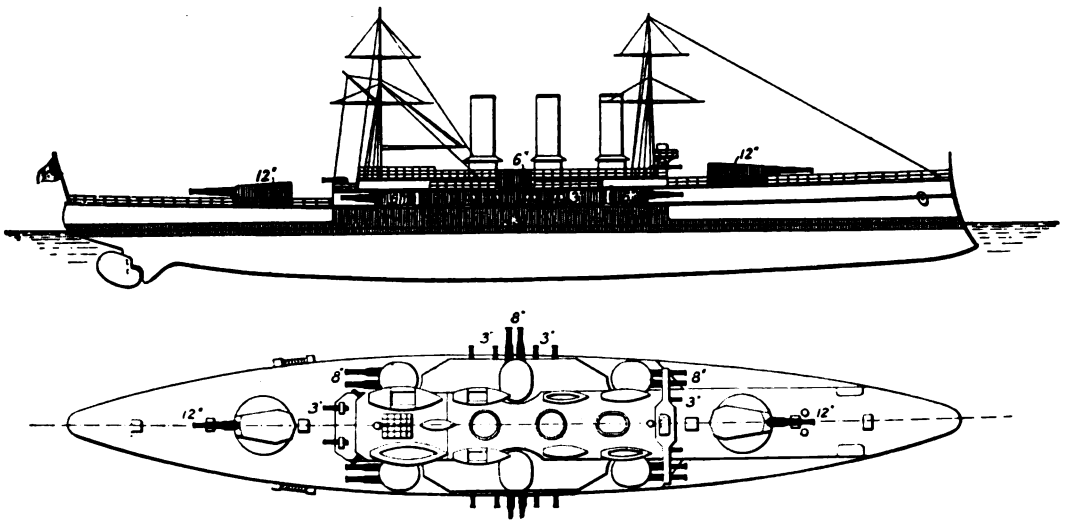
ITALY.

BATTLESHIPS.

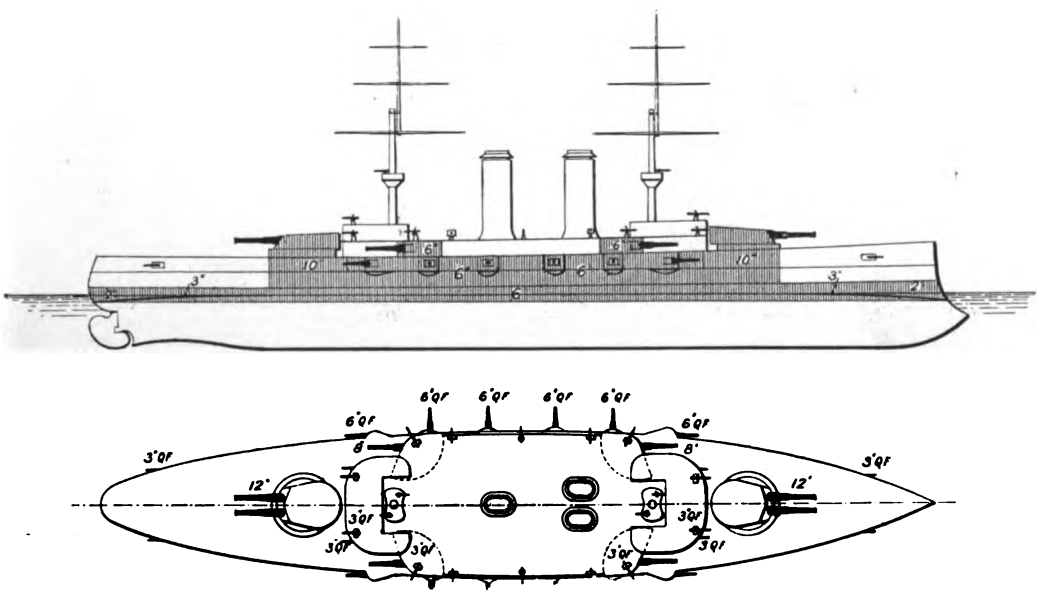
Napoli. **Regina Elena.** **Roma.** **Vittorio Emanuele.**



Length, 435 ft. ; 12,425 tons ; Speed, 22 knots ; Completed, 1907—1909 ;
Armament, 2—12 in., 12—8 in., 12—3 in., 12 small.

See page 234.

Benedetto Brin. **Regina Margherita.**



Length, 426 ft. ; 13,214 tons ; Speed, 19·5–20·2 knots ; Completed, 1904 ;
Armament, 4—12 in., 4—8 in., 12—6 in., 16—3 in. 12 small.

See page 234.

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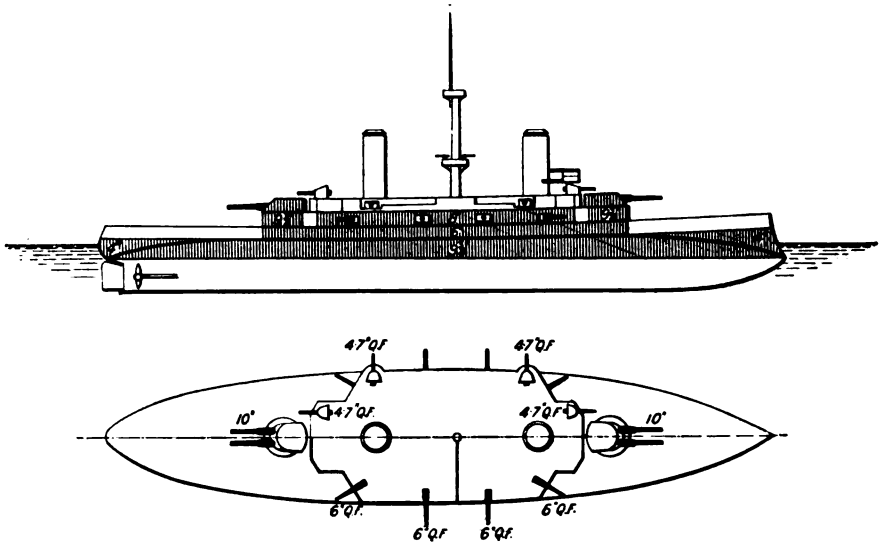
ITALY.

BATTLESHIPS.

Ammiraglio di St. Bon. **Emanuele Filiberto.**

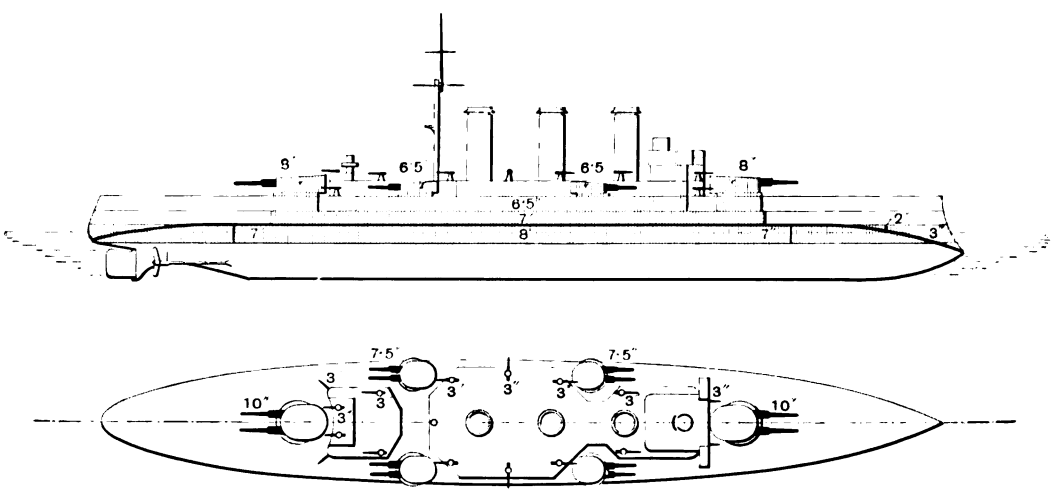


Length, 344 ft. ; 9645 tons ; Speed, 18·3 knots ; Completed, 1901–1902 ;
Armament, 4—10 in., 8—6 in., 8—4·7 in., 2—2·9 in., 22 small.

See page 234.

ARMOURED CRUISERS.

Amalfi. **Pisa.**



Length, 430 ft. ; 9,832 tons ; Speed, 23 knots ; Completed, 1909 ;
Armament, 4—10 in., 8—7·5 in., 16—3 in., 2 small.

See page 234.

PLATE 40.

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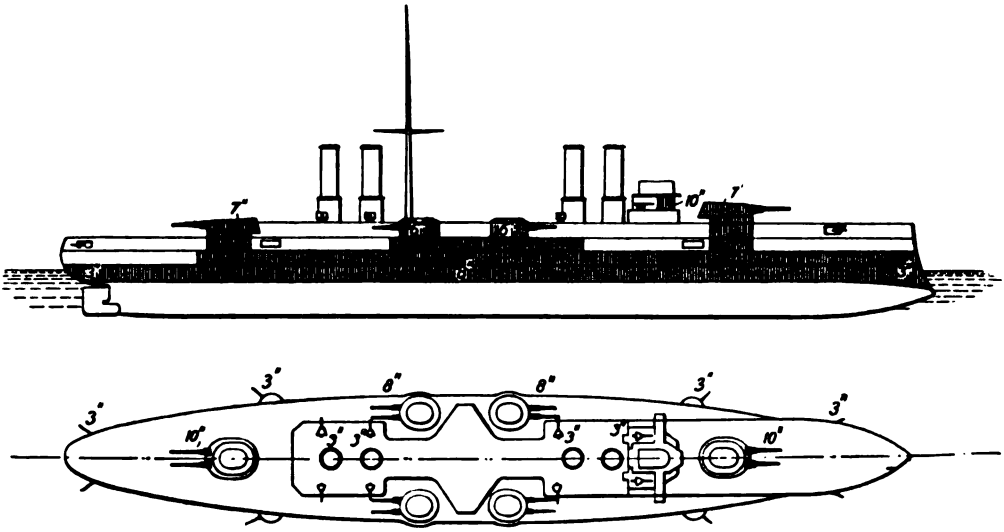
ITALY.

ARMOURED CRUISERS.

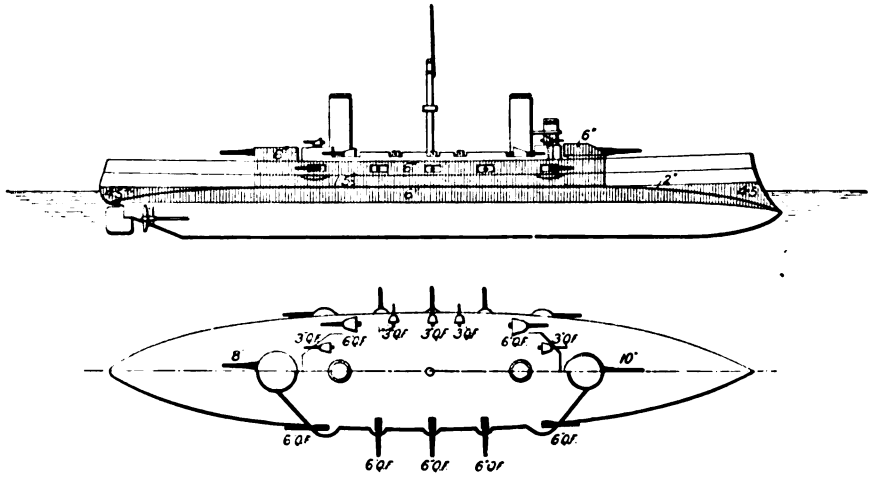
S. Giorgio. **S. Marco.**



Length, 430 ft. ; 9832 tons ; Speed, 22·5 knots ; Building ;
Armament, 4—10 in., 8—8 in., 16—3 in.

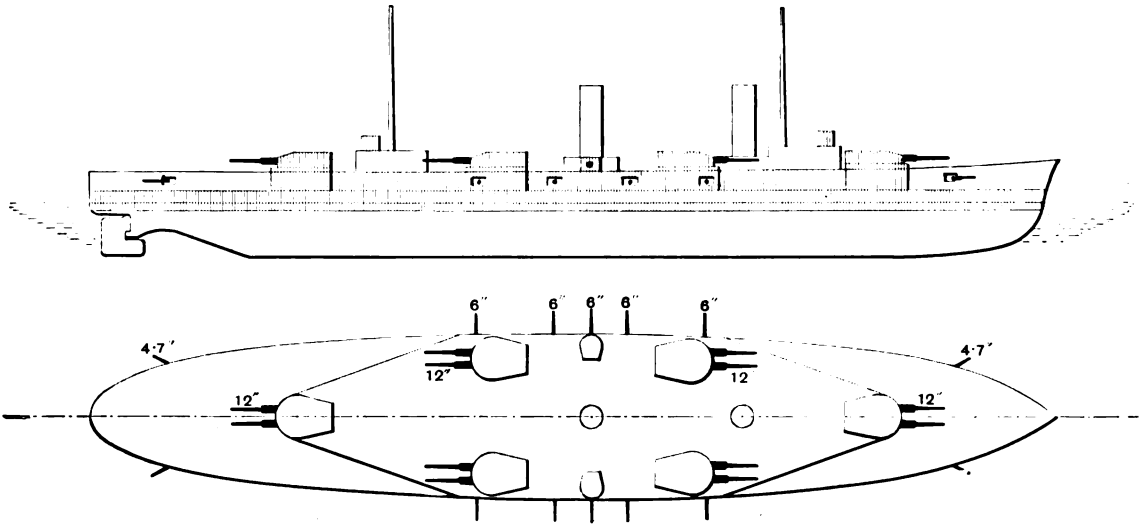
See page 235.

Francesco Ferruccio. **Giuseppe Garibaldi.** **Varese.**


6"
6"
6"

BATTLESHIPS.

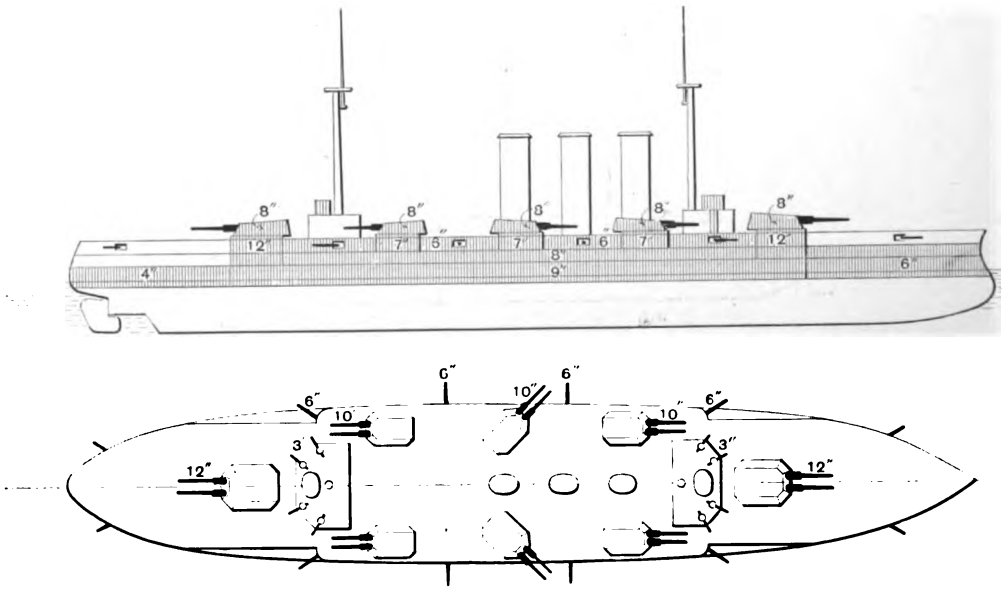
Kawachi. **Settsu.**



Length, 480 ft. ; 20,800 tons ; Speed, 20·5 knots ; Building ;
Armament, 12—12 in. ; 10—6 in. ; 12—4·7 in.

See page 239.

Aki.



Length, 482 ft. ; 19,800 tons ; Speed, 20·5 knots ; Completed 1911 ;
Armament, 4—12 in., 12—10 in., 8—6 in., 8—12 pr., 4 small.

See page 238.

PLATE 42.

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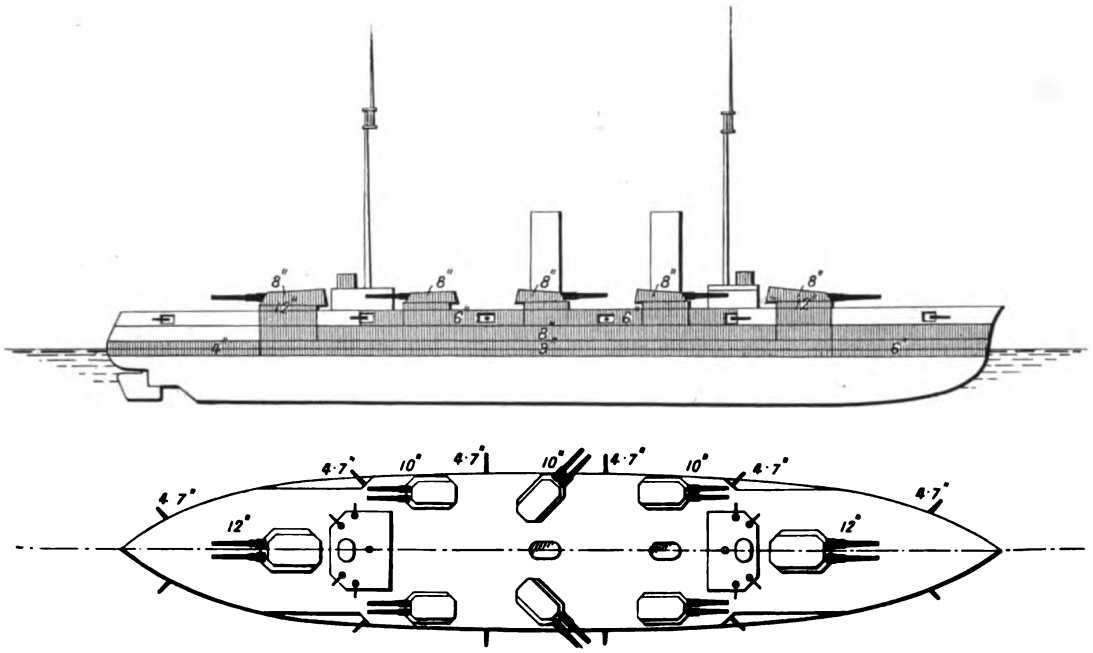
JAPAN.

BATTLESHIPS.

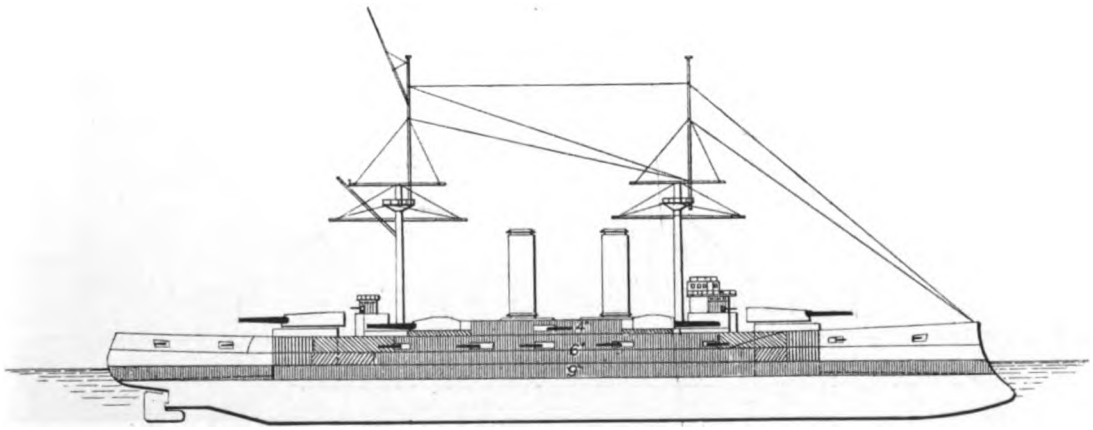
Satsuma.



Length, 482 ft. ; 19,350 tons ; Speed, 20·5 knots ; Completed, 1909;
Armament, 4—12 in., 12—10 in., 12—4·7 in., 4—12 pr., 4 small.

See page 239

Kashima. Katori.



Length, 420–425 ft. ; 15,950–16,400 tons ; Speed, 19·5 knots ; Completed, 1906 ;
Armament, 4—12 in., 4–10 in., 12—6 in., 12—12 pr., 21 small.

See page 238.

PLATE 43.

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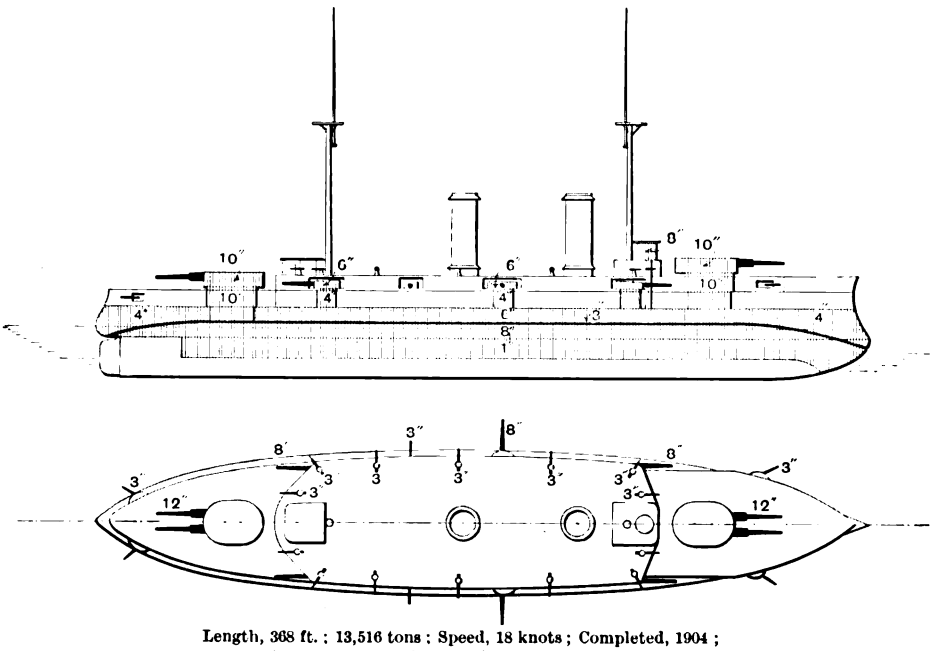
JAPAN.

BATTLESHIPS.

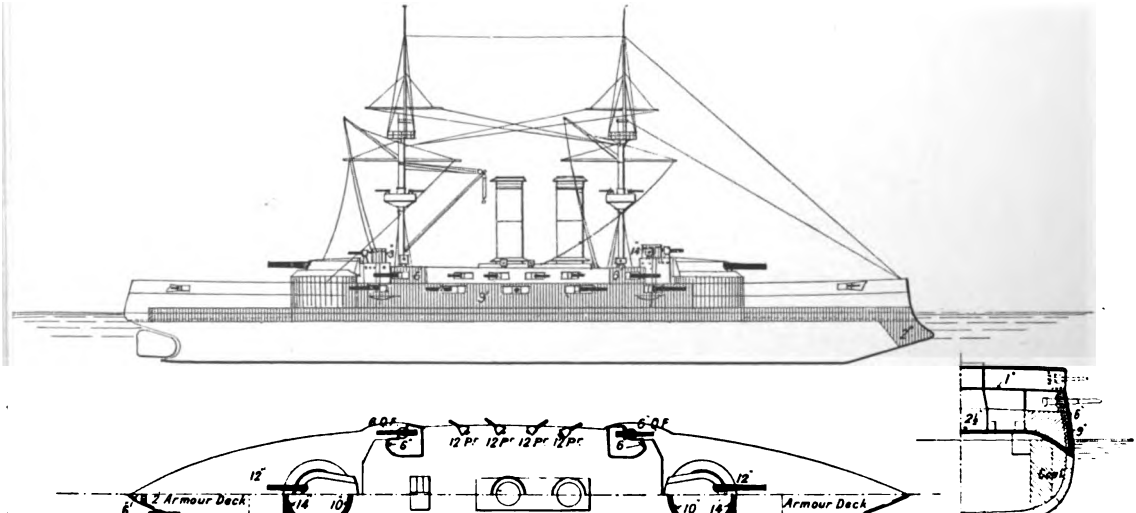
Iwami (*ex* Orel).



Length, 368 ft. ; 13,516 tons ; Speed, 18 knots ; Completed, 1904 ;
Armament, 4—12 in., 6—8 in., 20—3 in., 26 small.

See page 238.

Mikasa.



Length, 400 ft. ; 15,200 tons ; Speed, 18·5 knots ; Completed, 1902 ;
Armament, 4 - 12 in., 4—10 in., 10—6 in., 20—12 pr., 20 small.

See page 239.

NOTE.—4—10 in. guns have been substituted for 4—6 in. on upper deck.

PLATE 44.

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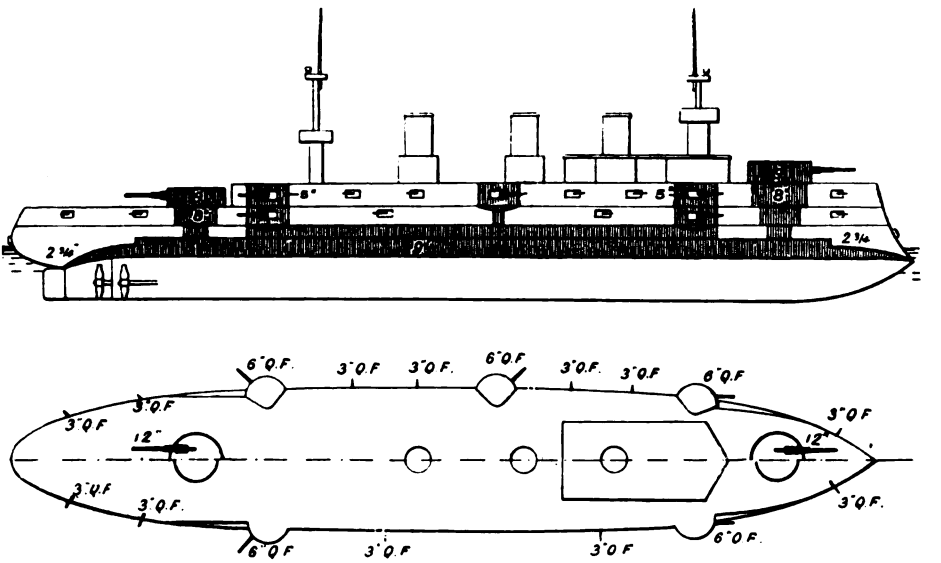
BATTLESHIPS.

Sagami *late* **Peresviet.** **Suo** *late* **Pobieda.**

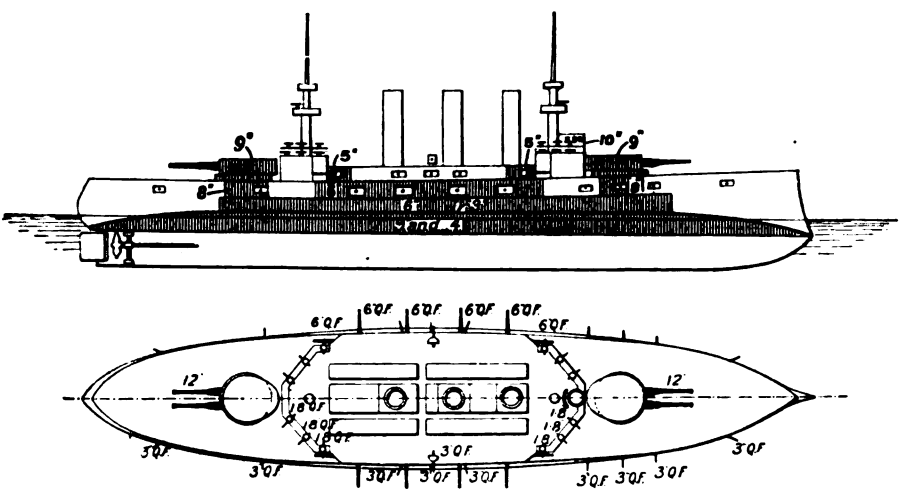


Note: In the "Pobieda" the Belt Extends the Full Length of the Ship.

Length, 401 ft. ; 12,674 tons ; Speed, 18 knots ; Completed, 1901 ;
Armament, 4—12 in., 10—6 in., 16—12 pr., 27 small.

See page 239.

Hizen *late* **Retvizan.**



Length, 374 ft. ; 12,700 tons ; Speed, 18 knots ; Completed, 1902 ;
Armament, 4—12 in., 12—6 in., 20—12 pr., 6 small.

See page 238.

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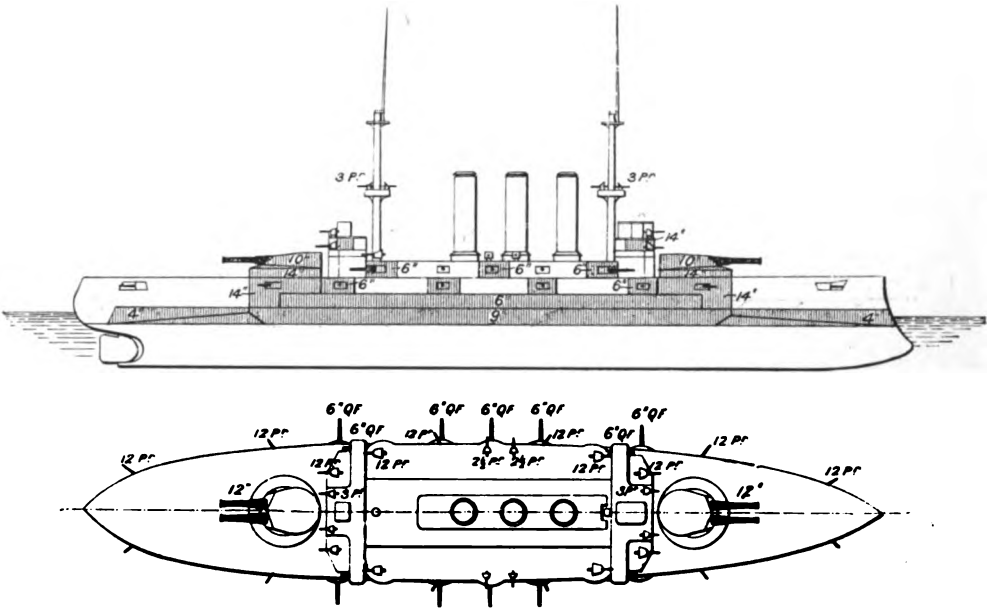
JAPAN.

BATTLESHIPS.

Asahi. **Shikishima.**

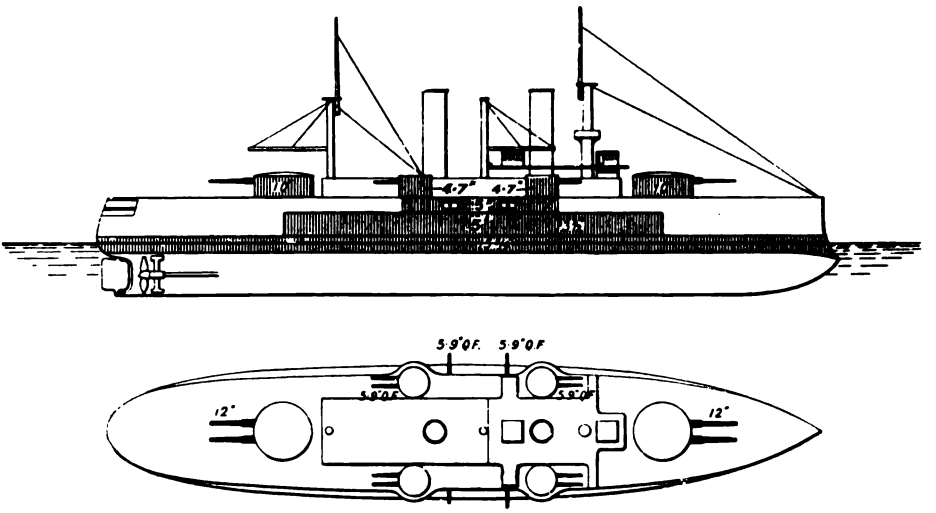


The "Asahi" has but two funnels.

Length, 400 ft. ; 14,850–15,800 tons ; Speed, 18—18·3 knots ; Completed, 1899–1900 ;
Armament, 4—12 in., 14—6 in., 20—12 pr., 12 small.

See page 238.

Tango *late* **Poltava.**



Length, 367 ft. ; 10,960 tons ; Speed, 16 knots ; Completed, 1898 ;
Armament, 4—12 in., 12 -5·9 in., 14 small.

See page 239.

PLATE 46.

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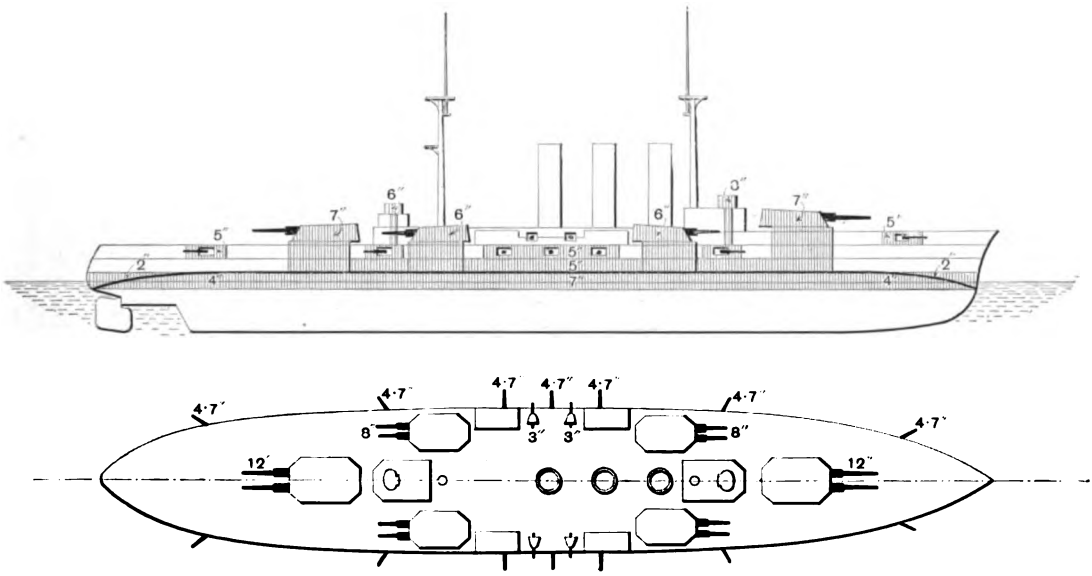
JAPAN.

ARMOURED CRUISERS.

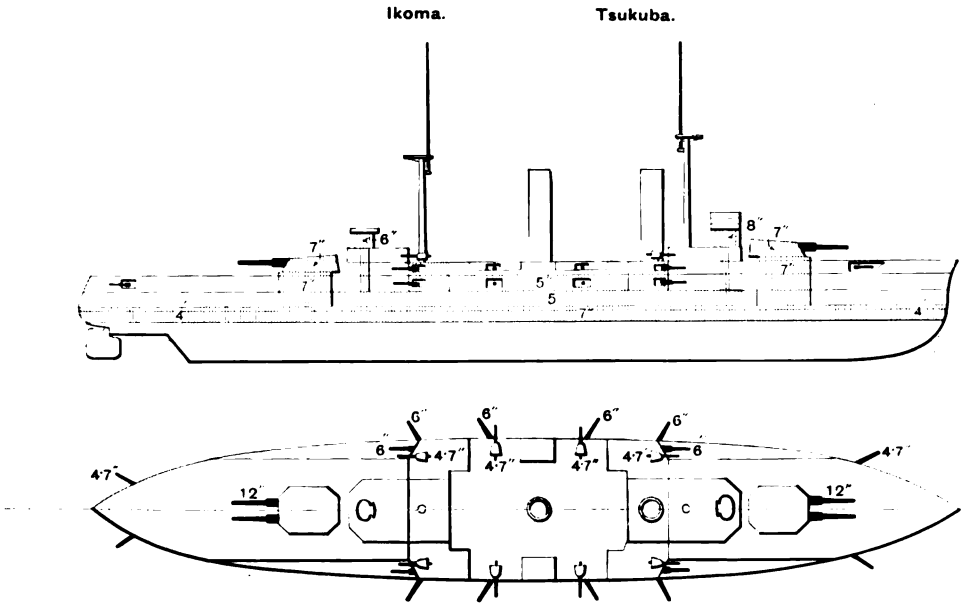
Ibuki. **Kurama.**



Length, 450 ft. ; 14,620 tons ; Speed, 22 knots ; Ibuki, Completed, 1909–1911 ; Kurama, Completed, 1909–1911 ; Armament, 4—12 in., 8—8 in., 14—4·7 in., 9 small.

See page 288.

Ikoma. **Tsukuba.**



Length, 440 ft. ; 13,750 tons ; Speed, 21 knots ; Completed, 1907 ; Armament, 4—12 in., 12—6 in., 12—4·7 in., 8 small.

See page 238.

PLATE 47.

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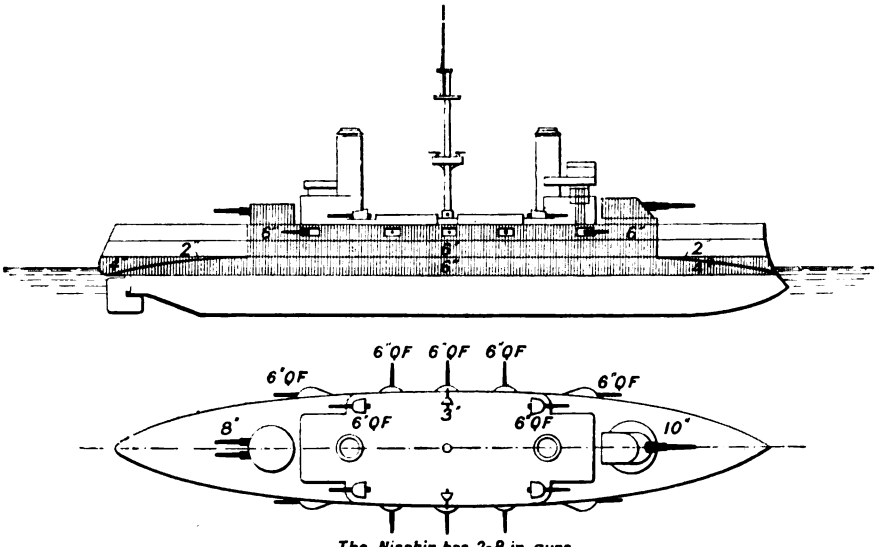
JAPAN.

ARMOURED CRUISERS.

Kasuga. **Nisshin.**

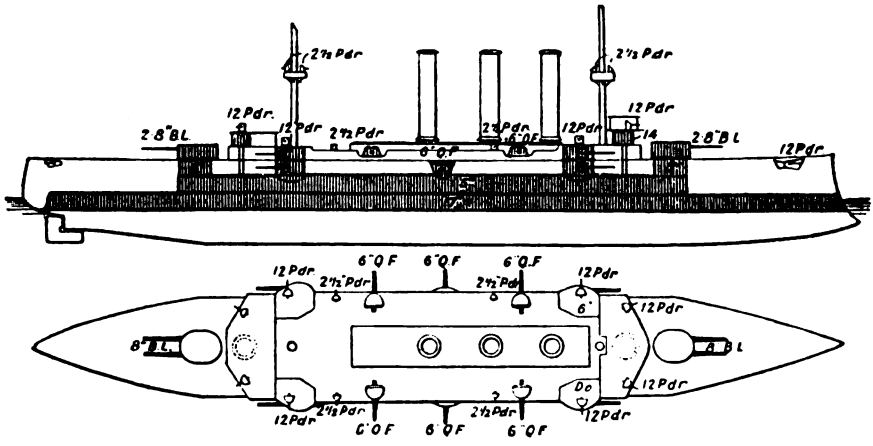


The Nisshin has 2-8 in. guns in fore barbette.

Length, 344 ft.; 7299—7700 tons; Speed, 20 knots; Completed, 1904; Armament, 1—10 in., 2—8 in., 14—6 in., 10—3 in., 8 small.

See page 239.

Idzumo. ***Adzuma.** **Iwati.** ***Yakumo.**



Length, 400—431 ft.; 9436—9850 tons; Speed, 20—22 knots; Completed, 1901; Armament, 4—8 in., 14—6 in., 12—12 pr., 8 small.

*12—6 in. guns.

See page 238.

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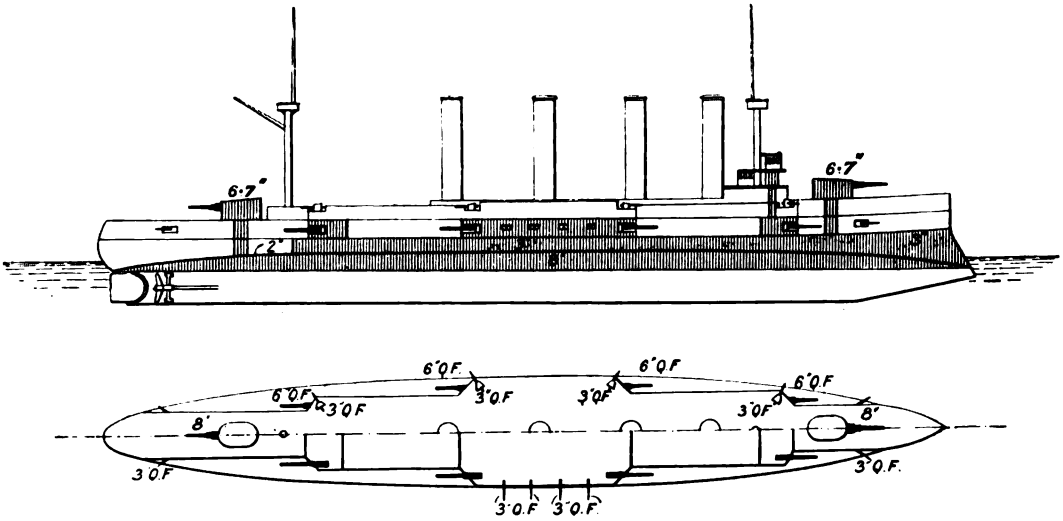
JAPAN.

ARMOURED CRUISERS.

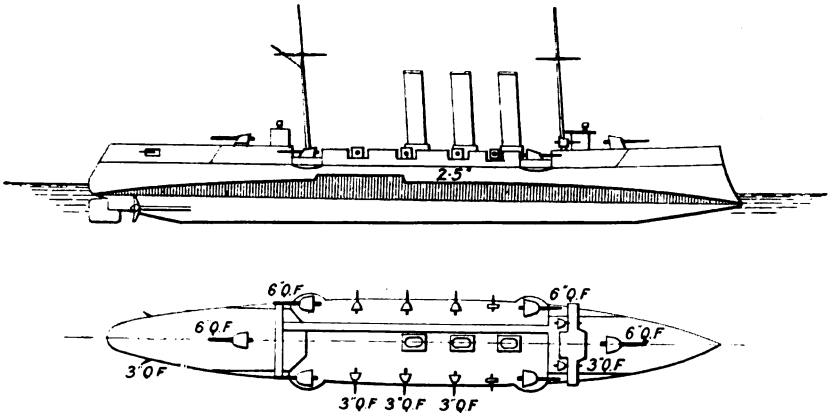
Aso *late* Bayan.


6·7"
6·7"
6"
6"
6

JAPAN.

CRUISERS.

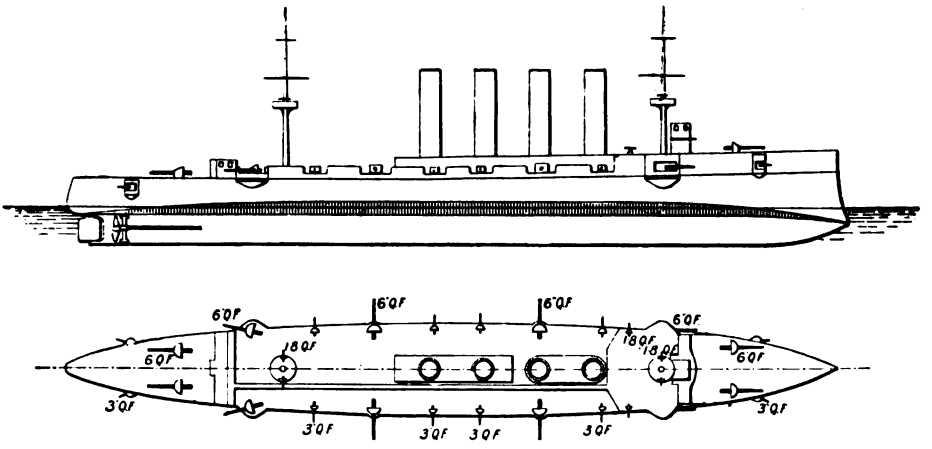
Niitaka. **Tsushima.**



Length, 235 ft. ; 3365 tons ; Speed, 20 knots ; Completed, 1904–5 ;
Armament, 6—6 in., 10—3 in., 4 small.

See page 240.

Sōya *late* **Waryag.**



Length, 420 ft. ; 6500 tons ; Speed, 23 knots ; Completed, 1900 ;
Armament, 12—6 in., 12—12 pr., 6 small.

See page 241.

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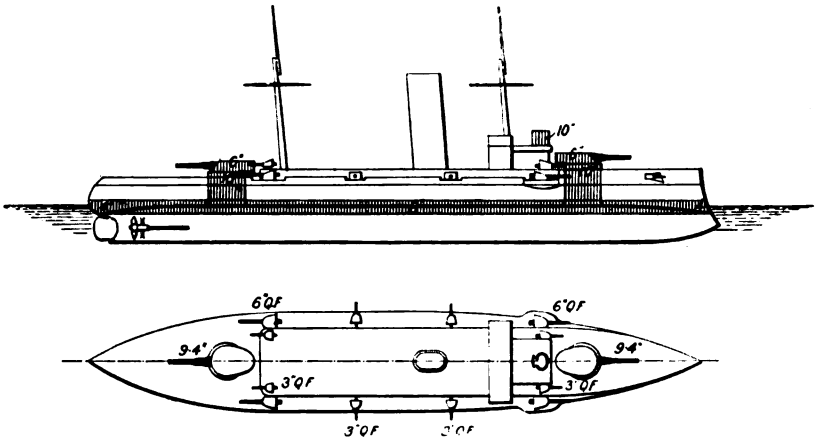
NETHERLANDS.

COAST DEFENCE SHIPS.

De Ruyter. **Hertog Hendrik.** **Koningin Regentes.** **Marten Tromp.**



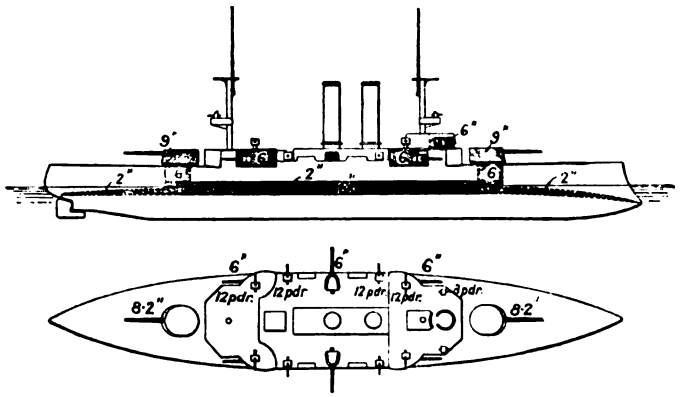
Length, 317 ft. ; 5014—5211 tons ; Speed, 16·5 knots ; Completed, 1902—1906 ;
Armament, 2—9·4 in., 4—6 in., 10—3 in., 4 small.

See page 242.

NORWAY.

COAST DEFENCE SHIPS.

Norge. **Eidsvoid.**



Length, 290 ft. ; 3847 tons ; Speed, 16·5 knots : Completed, 1901 ;
Armament, 2—8·2 in., 6—6 in., 8—12 pr., 6 small.

See page 244.

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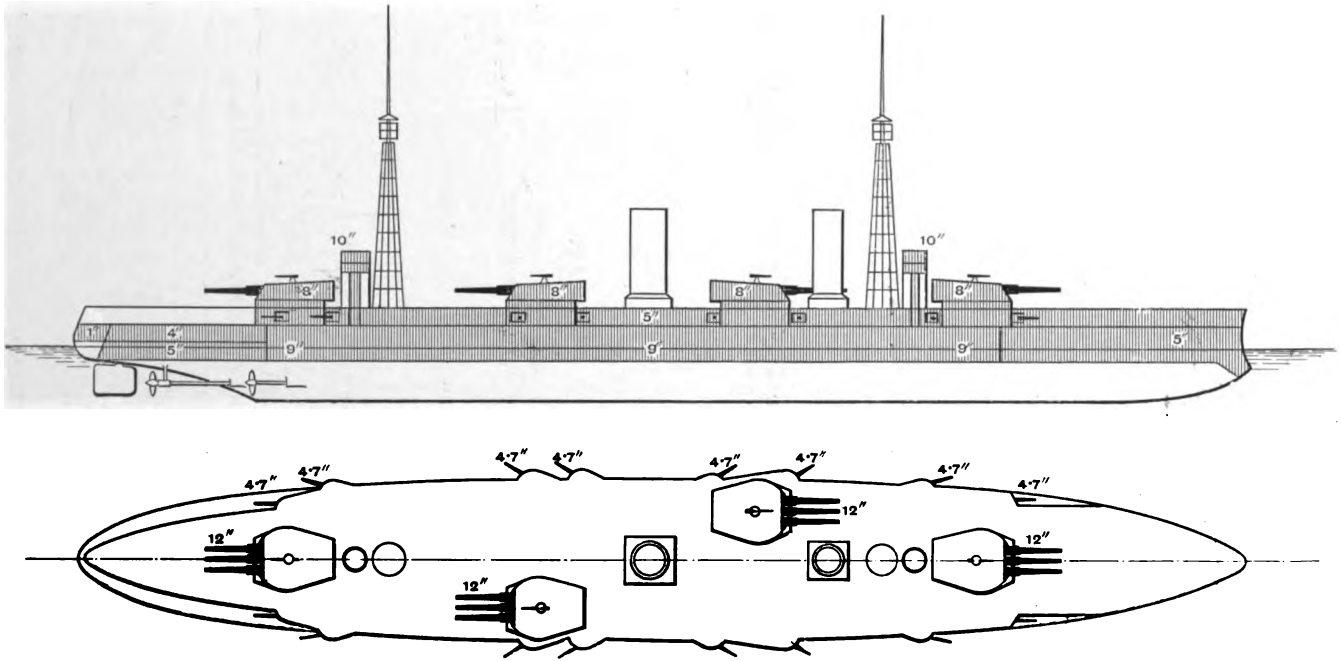
RUSSIA.

BATTLESHIPS.

Gangut. Petropavlosk. Poltava. Sevastopol.



Length, 590 ft. ; 23,000 tons ; Speed, 23 knots ; Building ;
Armament, 12—12 in., 16—4·7 in., 4—small.

See page 246.

PLATE 52.

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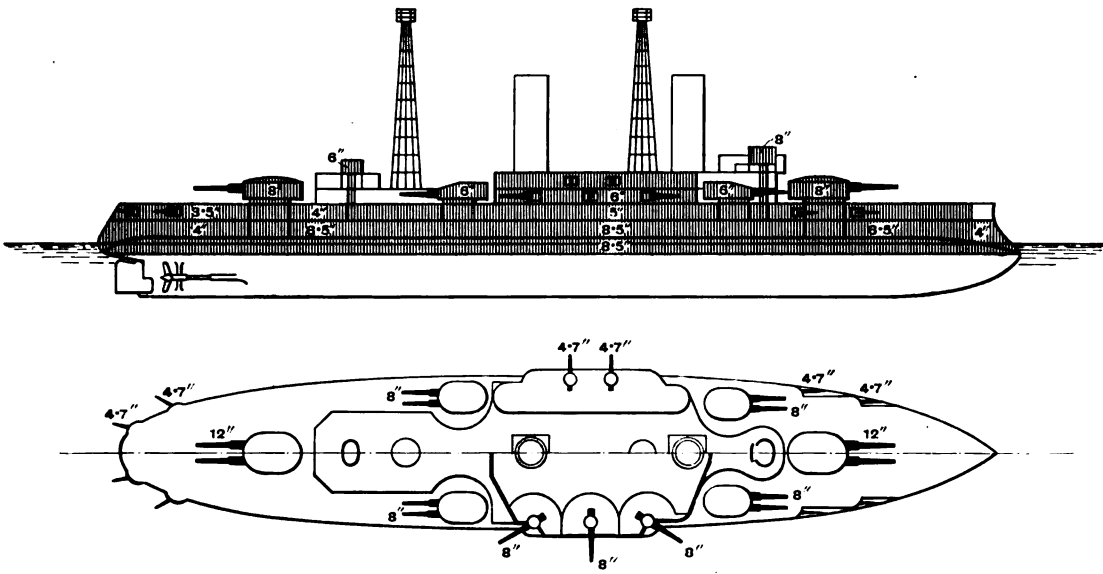
RUSSIA.

BATTLESHIPS.

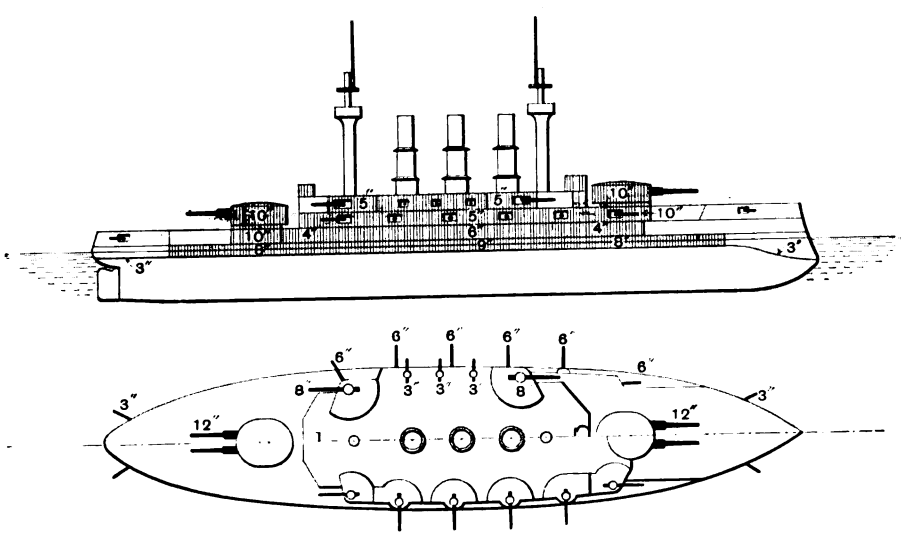
Andrei Pervozvannyi. **Imperator Pavel.**



Length, 430 ft. ; 17,200 tons ; Speed, 18 knots ; Completed, 1910 ;
Armament, 4—12 in., 14—8 in., 20—4·7 in.

See page 246.

Evstafi. **Ioann Zlatoust.**



Length, 372 ft. ; 12,733 tons ; Speed, 16 knots ; Evstafi, Completed, 1910 ; Ioann Zlatoust, Building ;
Armament, 4—12 in., 4—8 in., 12—6 in., 14—3 in., 18 small.

See page 246.

PLATE 53.

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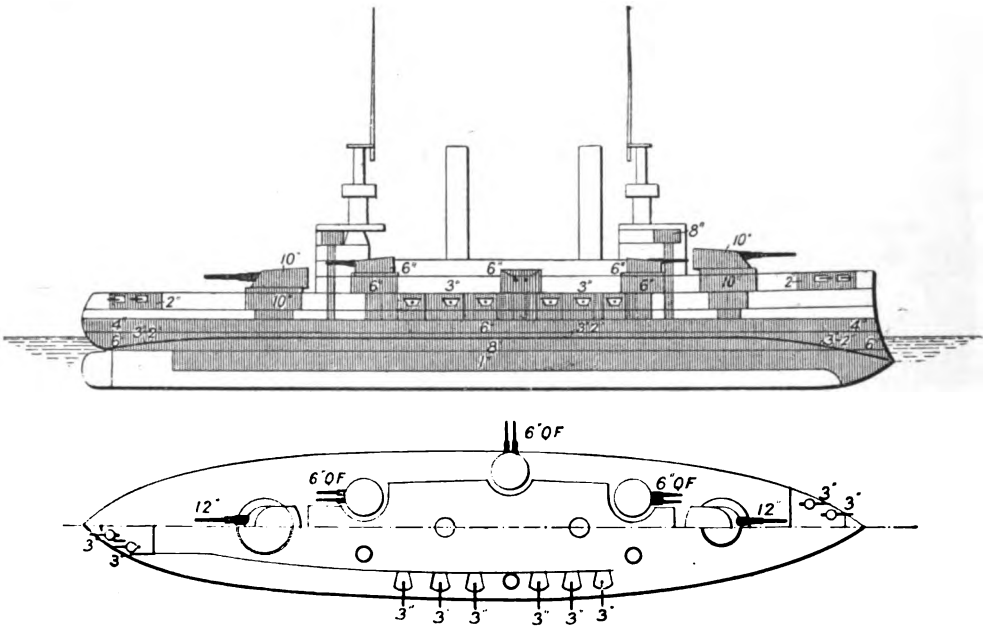
RUSSIA.

BATTLESHIPS.

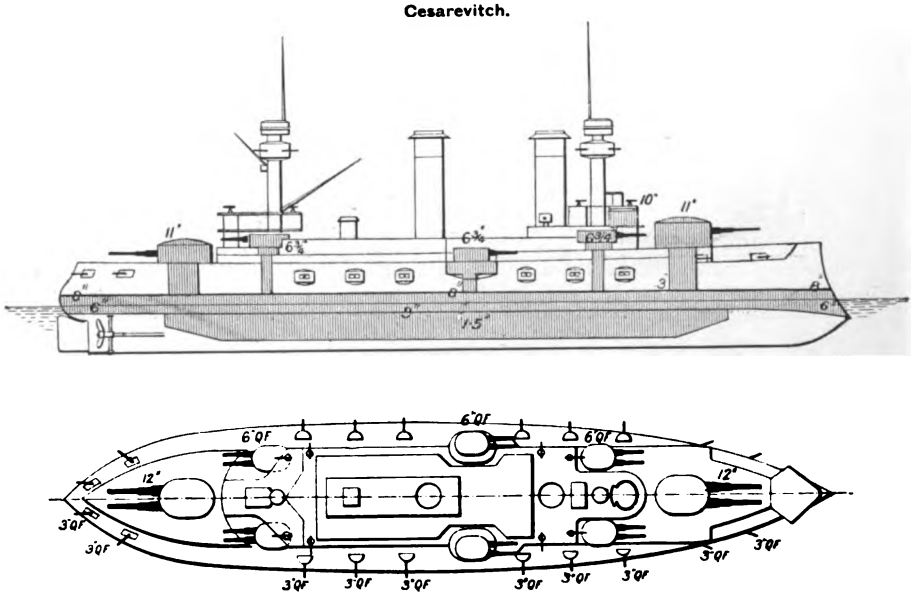
Slava.



Length, 367 ft. ; 13,516 tons ; Speed, 18 knots ; Completed, 1906 ;
Armament, 4—12 in., 12—6 in., 20—3 in., 26 small.

See page 247.

Cesarevitch.



Length, 389 ft. ; 12,912 tons ; Speed, 19·6 knots ; Completed, 1902 ;
Armament, 4—12 in., 12—6 in., 20—3 in., 32 small.

See page 246.

PLATE 54.

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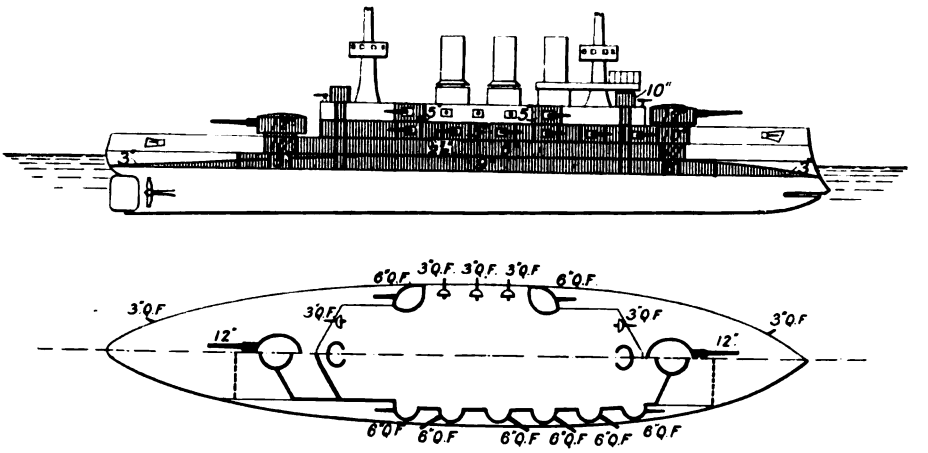
BATTLESHIPS.

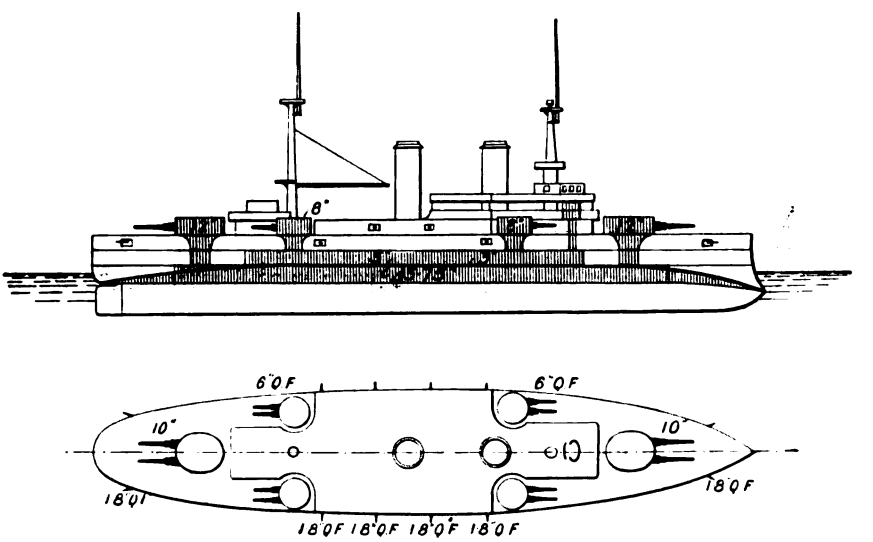
Panteleimon, *ex* Kniaz Potemkine Tavritchesky.



Length, 372 ft. ; 12,480 tons ; Speed, 17 knots ; Completed, 1902 ;
Armament, 4—12 in., 16—6 in., 14—3 in., 28 small.

See page 247.

Rostislav.



Length, 341 ft. ; 8880 tons ; Speed, 16 knots ; Completed, 1899 ;
Armament, 4—10 in., 8—6 in., 18 small.

See page 247.

PLATE 55.

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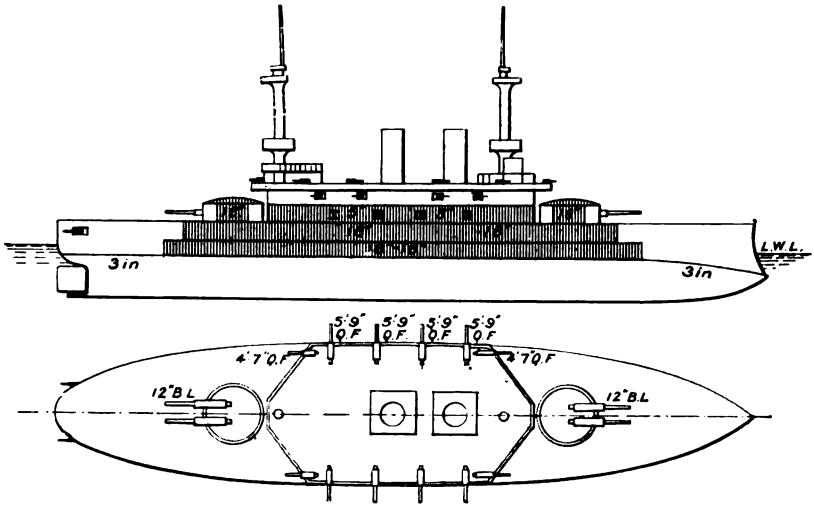
RUSSIA.

BATTLESHIPS.

Tria Sviatitelia.

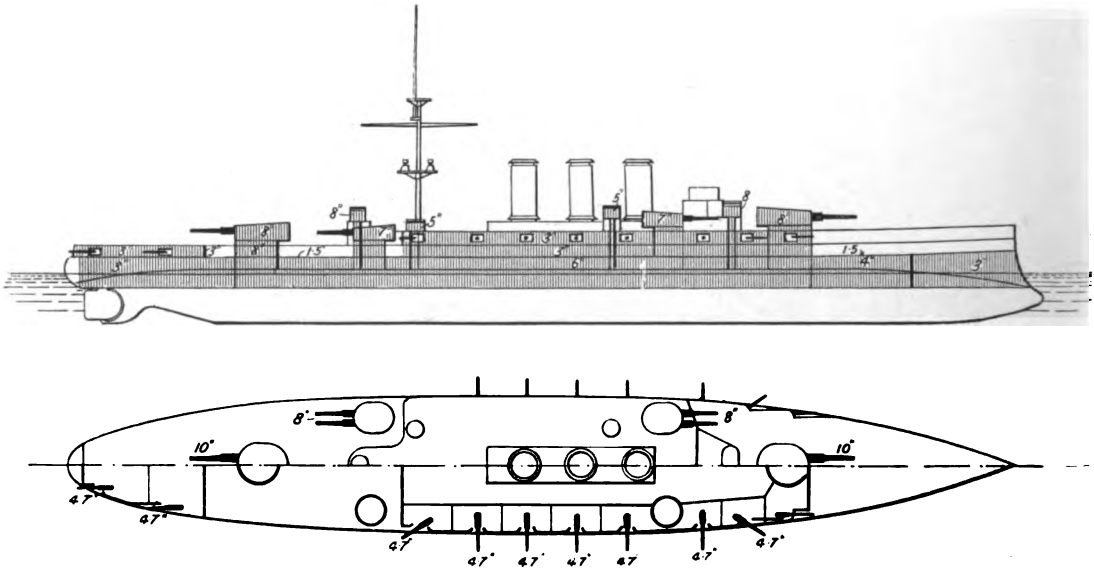


Length, 357 ft. ; 13,318 tons ; Speed, 18 knots ; Completed, 1896 ;
Armament, 4—12 in., 8—5·9 in., 4—4·7 in., 50 small.

See page 247.

ARMOURED CRUISERS.

Rurik.



Length, 490 ft. ; 15,170 tons ; Speed, 21 knots ; Completed, 1907 ;
Armament, 4—10 in., 8—8 in., 20—4·7 in., 12 small.

See page 247.

PLATE 56.

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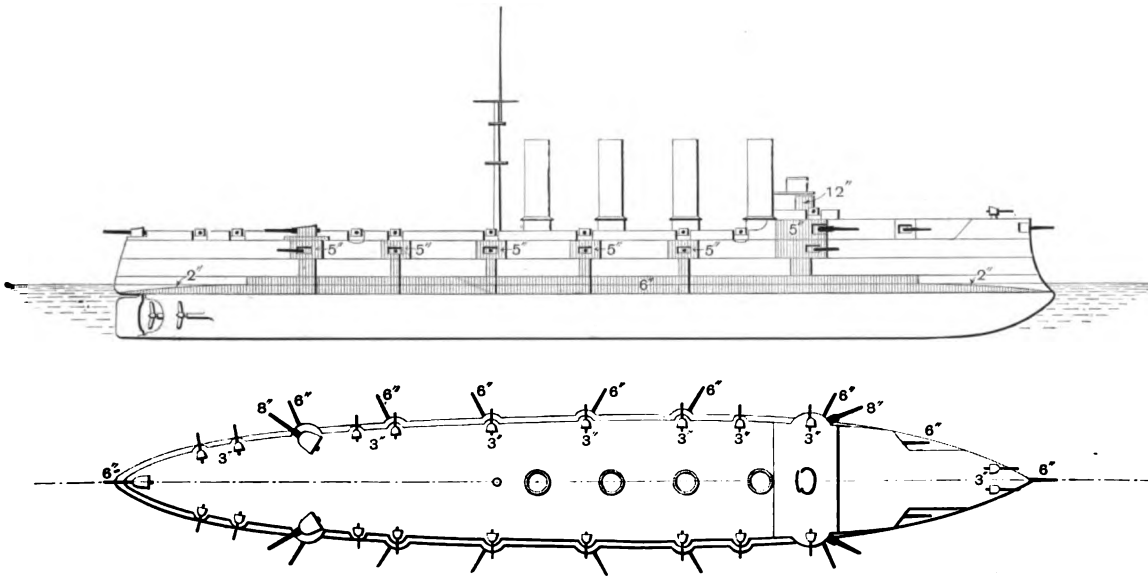
RUSSIA.

ARMOURED CRUISERS.

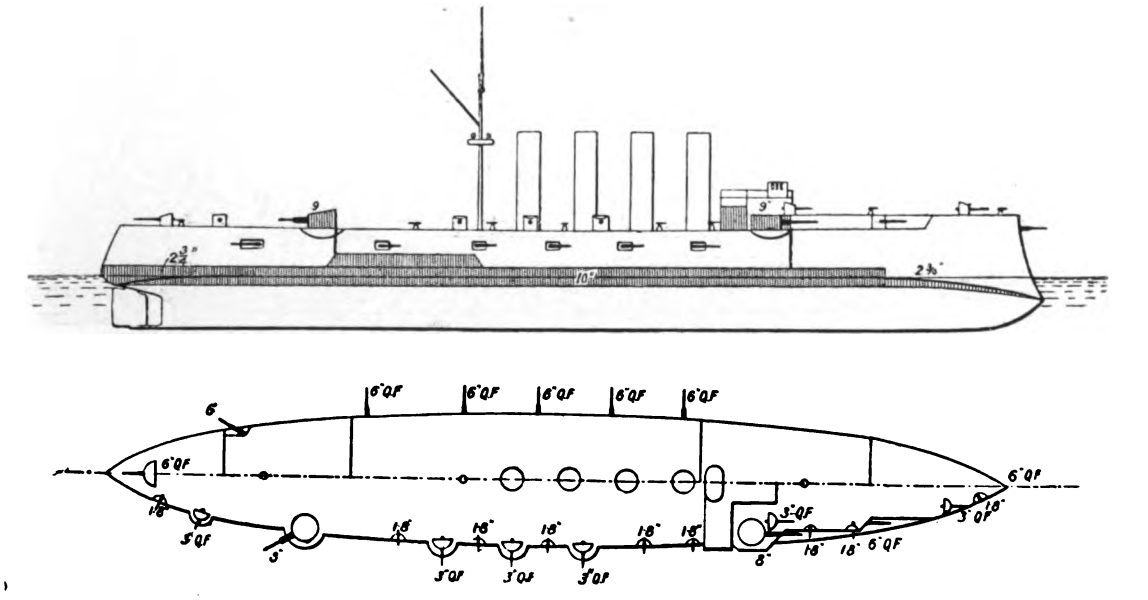
Gromoboi.



Length, 473 ft. ; 12,336 tons ; Speed, 20 knots ; Completed, 1900 ;
Armament, 4—8 in., 16—6 in., 20—3 in., 20 small.

See page 246.

Rossia.



Length, 480 ft. ; 12,130 tons ; Speed, 20 knots ; Completed, 1898 ;
Armament, 4—8 in., 16—6 in., 12—3 in., 20 small.

See page 247.

PLATE 57.

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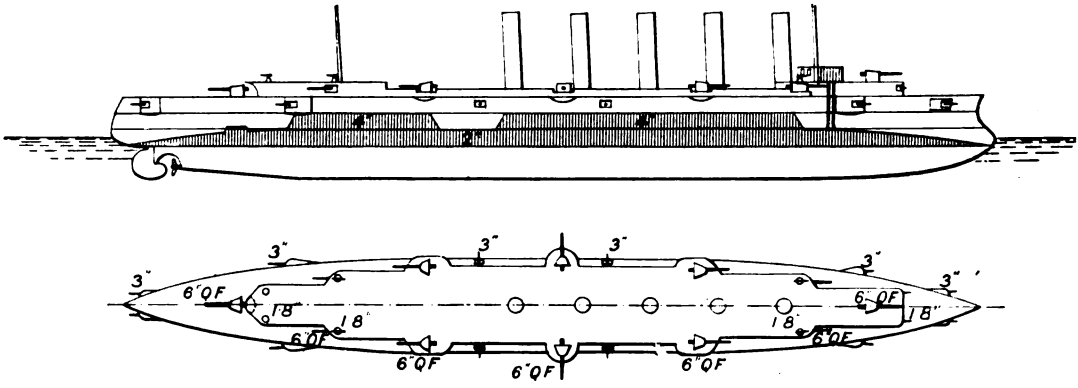
RUSSIA.

CRUISERS.

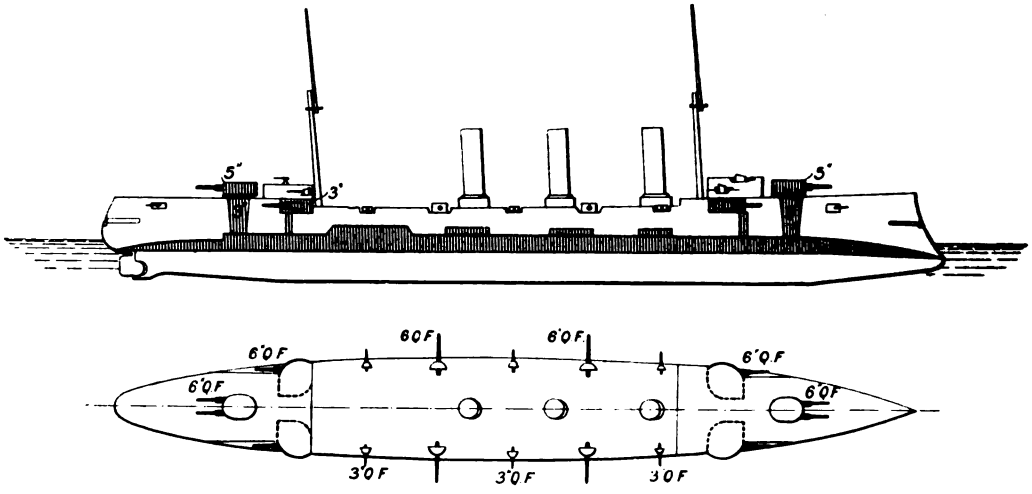
Askold.



Length, 426 ft. ; 5905 tons ; Speed, 23·8 knots ; Completed, 1901 ;
Armament, 12—6 in., 12—3 in., 12 small.

See page 248.

Bogatyr. **Oleg.**



Length, 417–440 ft. ; 6645–6675 tons ; Speed, 23–24 knots ; Completed, 1902–1904 ;
Armament, 12—6 in., 12—3 in., 10 small.

See page 248.

PLATE 58.

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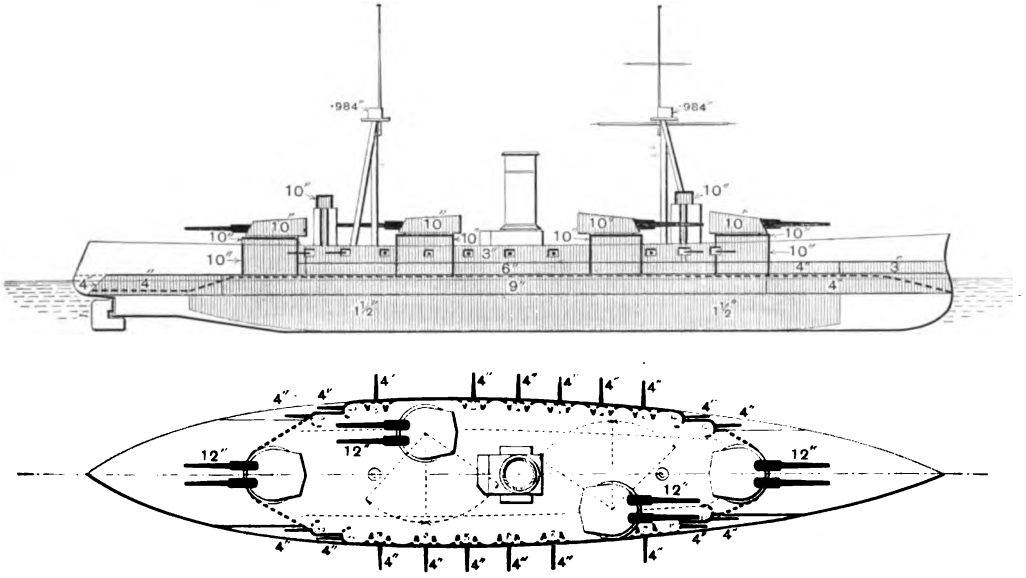
SPAIN.

BATTLESHIPS.

Alphonso XIII. **España.** **Jaime I.**

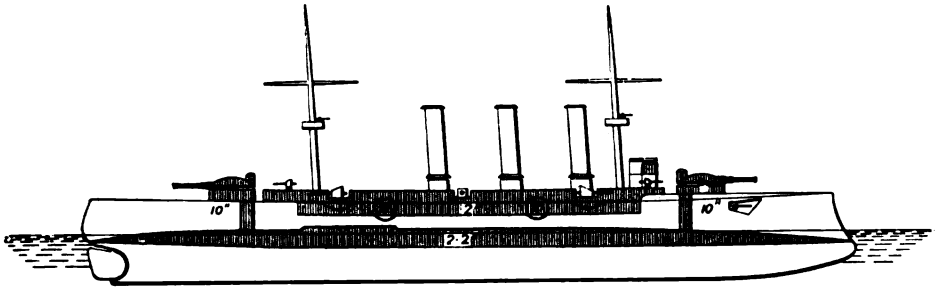


Length, 435 ft. ; 15,460 tons ; Speed, 19·5 knots ; Building ;
Armament, 8—12 in., 20—4 in., 6 small.

See page 250.

ARMOURED CRUISER.

Emperador Carlos V.



Length, 380 ft. ; 9089 tons ; Speed, 20 knots ; Completed, 1898 ;
Armament, 2—11 in., 8—5·5 in., 4—3·9 in., 12 small.

See page 250.

PLATE 59.

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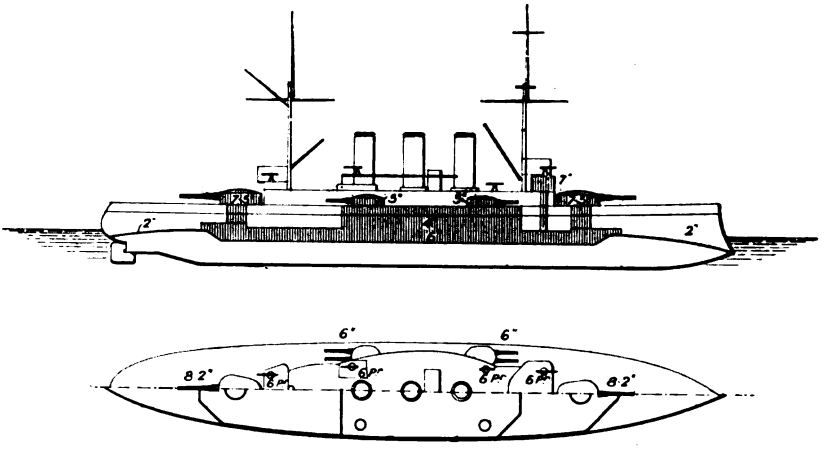
SWEDEN.

BATTLESHIP.

Oscar II.

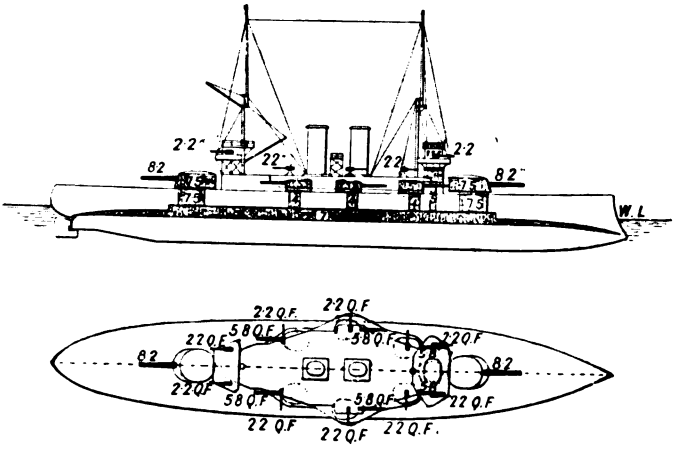


Length, 314 ft. ; 4203 tons ; Speed, 18 knots ; Completed, 1907 ;
Armament, 2—8·2 in., 8—6 in., 14 small.

See page 252.

COAST DEFENCE SHIPS.

Aeran. **Manligheten.** **Tapperheten.** **Wasa.**



Length, 287 ft. ; 3612 tons ; Speed, 16·5–17·2 knots ; Completed, 1901–1908 ;
Armament, 2—8·2 in., 6—5·8 in., 14 small.

See page 252.

PLATE 60.

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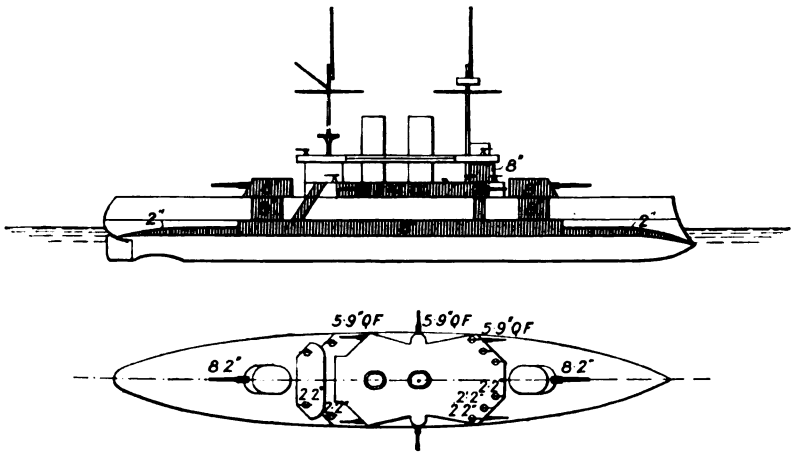
SWEDEN.

COAST DEFENCE SHIP.

Dristigheten.

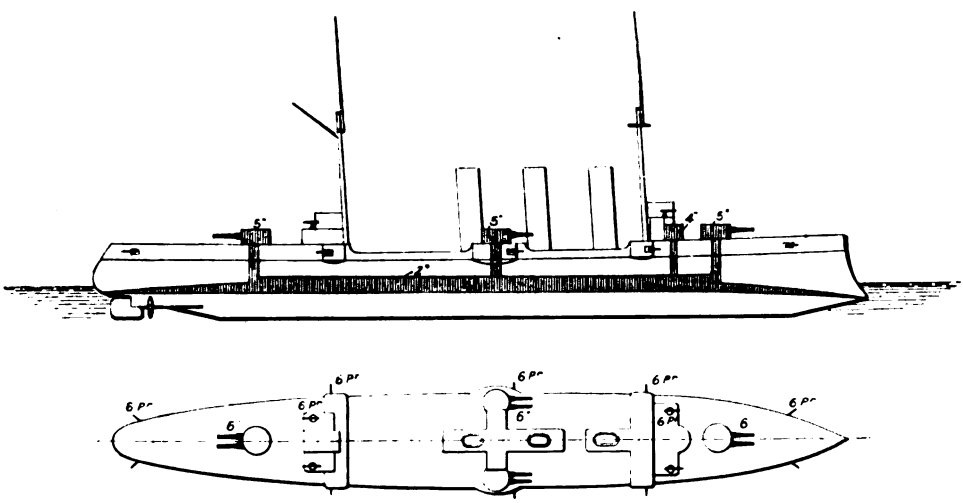


Length, 285 ft.; 3445 tons; Speed, 16·5 knots; Completed, 1901;
Armament, 2—8·2 in., 6—5·9 in., 12 small.

See page 252.

ARMOURED CRUISER.

Fylgia.



Length, 377 ft.; 4100 tons; Speed, 22·5 knots; Completed, 1907;
Armament, 8—6 in., 17 small.

See page 252.

PLATE 61.

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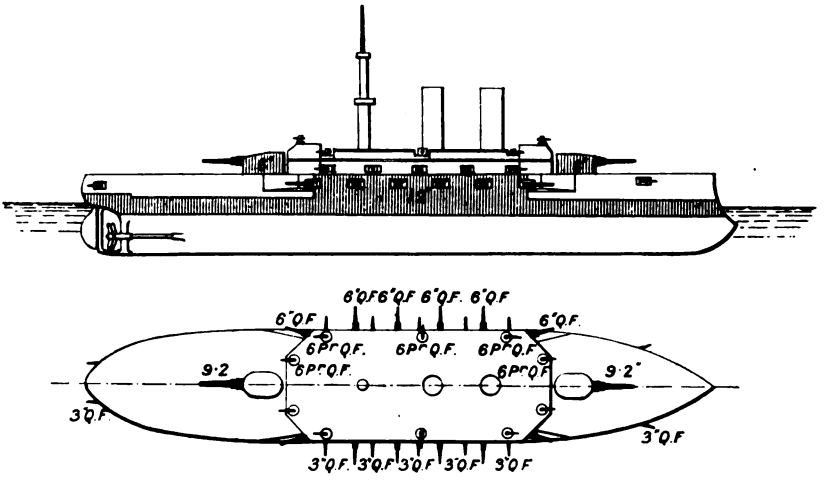
TURKEY.

BATTLESHIP.

Messoudieh.

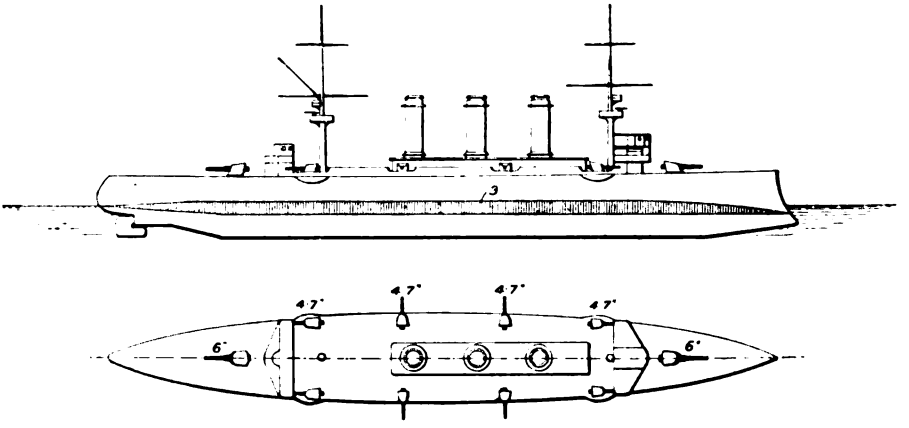


Length, 331 ft. ; 9120 tons ; Speed, 17·5 knots ; Completed, 1901 ;
Armament, 2—9·2 in., 12—6 in., 14—3 in., 14 small.

See page 254.

CRUISERS.

Abdul Hamid. Medjidieh.



Length, 331—340 ft. ; 3432—3800 tons ; Speed, 22·2 knots ; Completed, 1904 ;
Armament, 2—6 in., 8—4·7 in., 12 small.

See page 254.

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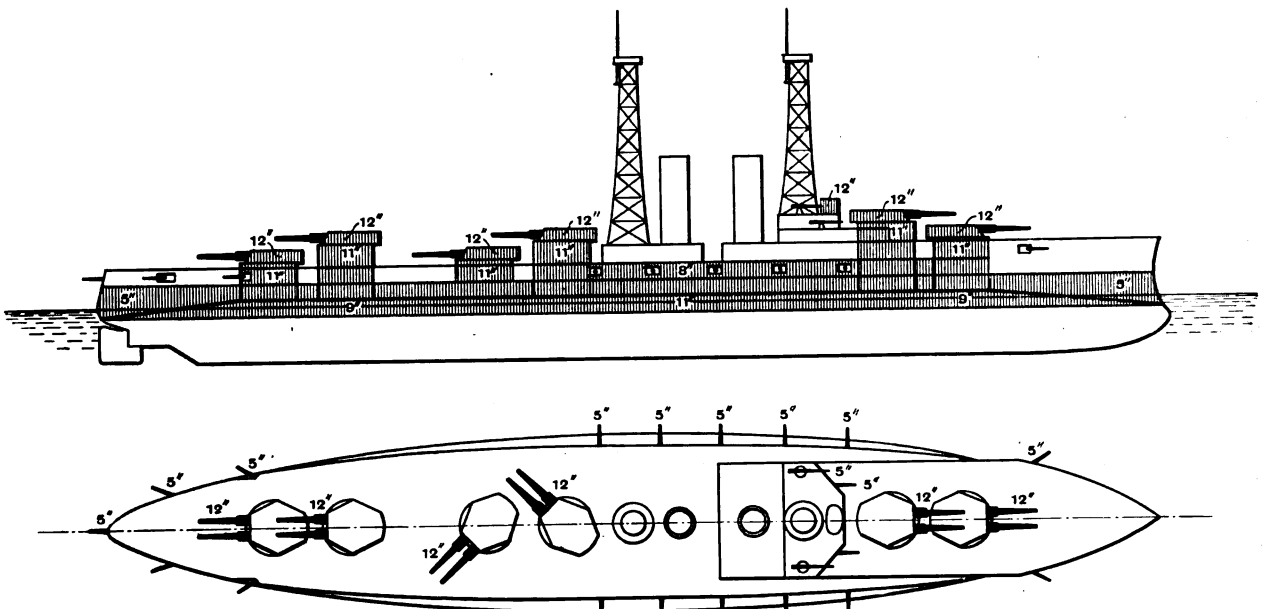
UNITED STATES.

BATTLESHIPS.

Arkansas. **Wyoming.**



Length, 554 ft. ; 26,000 tons ; Speed, 20·5 knots ; Building ;
Armament, 12—12 in., 21—5 in.

See page 255.

PLATE 63.
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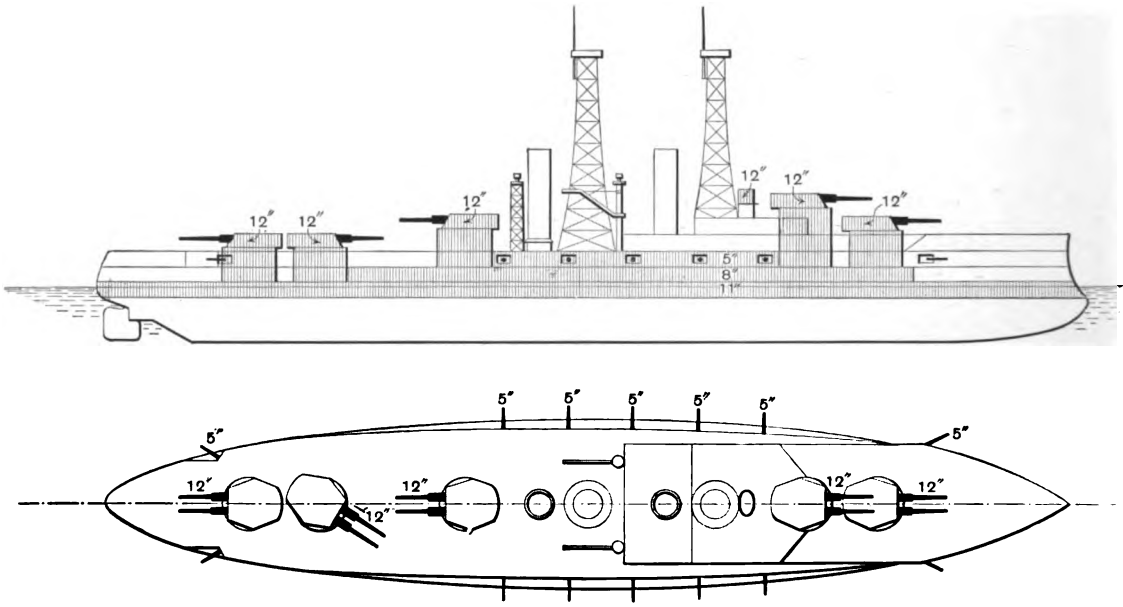
UNITED STATES.

BATTLESHIPS.

Delaware. **North Dakota.** **Florida.** **Utah.**

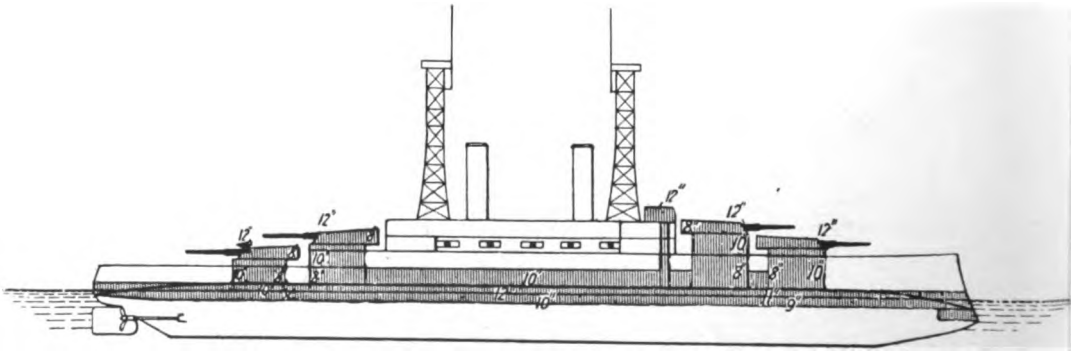


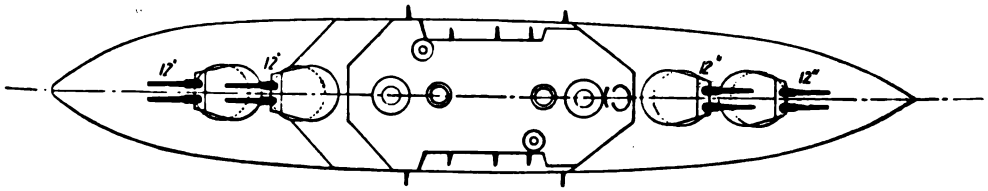
Delaware } Length, 510 ft. ; 20,000 tons ; Speed, 21·5 knots ; Completed, 1910 ;
North Dakota } Armament, 10—12 in., 14—5 in., 16 small.

Florida } Length, 510 ft. ; 21,825 tons ; Speed, 21 knots ; Building ;
Utah } Armament, 10—12 in., 16—5 in., 10 small.

See page 255.

Michigan. **South Carolina.**





Length, 450 ft. ; 16,000 tons ; Speed, 18·5 knots ; Completed, 1909
Armament, 8—12½in., 22—3 in., 16 small.

See page 256.

PLATE 64.

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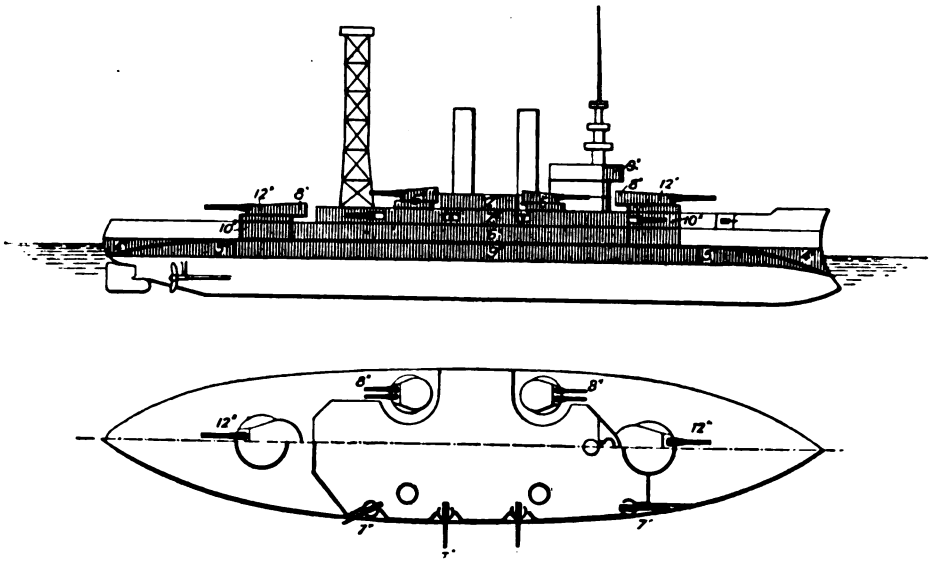
UNITED STATES.

BATTLESHIPS.

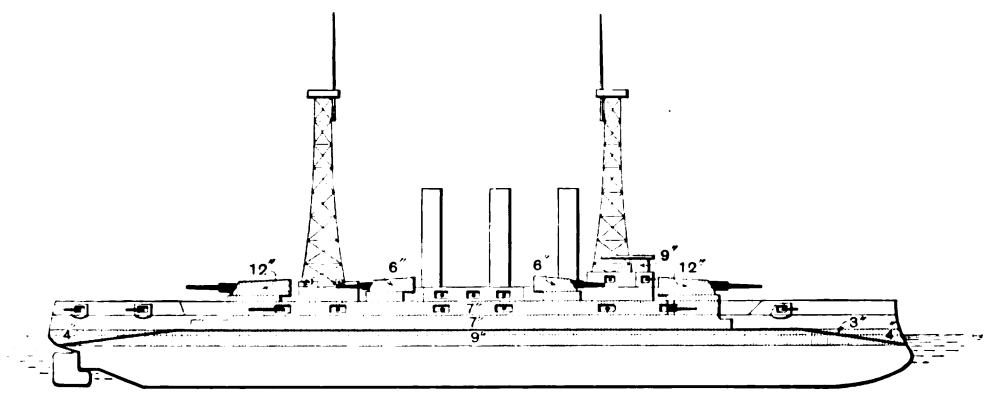
Idaho. **Mississippi.**

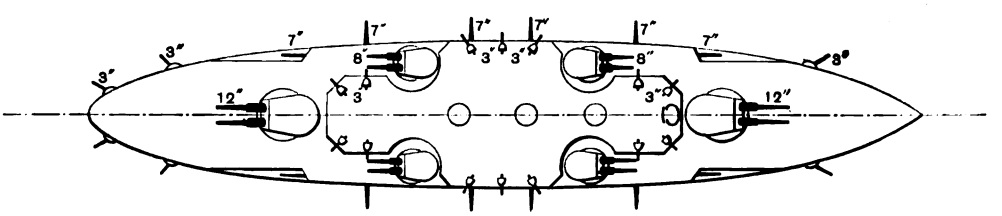


Length, 375 ft. ; 13,000 tons ; Speed, 17 knots ; Completed, 1900 ;
Armament, 4—12 in., 8—8 in., 8—7 in., 12—3 in., 20 small.

See page 255.

Connecticut. **Kansas.** **Louisiana.** **Minnesota.** **New Hampshire.** **Vermont.**





Length, 450 ft. ; 16,000 tons ; Speed, 18·1—18·8 knots ; Completed, 1906–1908 ;
Armament, 4—12 in., 8—8 in., 12—? in., 20—3 in., 30 small.

Connecticut and Louisiana have 11 in. belt instead of 9 in., and have only 2—3 in. guns at the stern. New Hampshire has two military masts in place of the towers. Minnesota has one mast and one tower.

See page 255.

PLATE 65.

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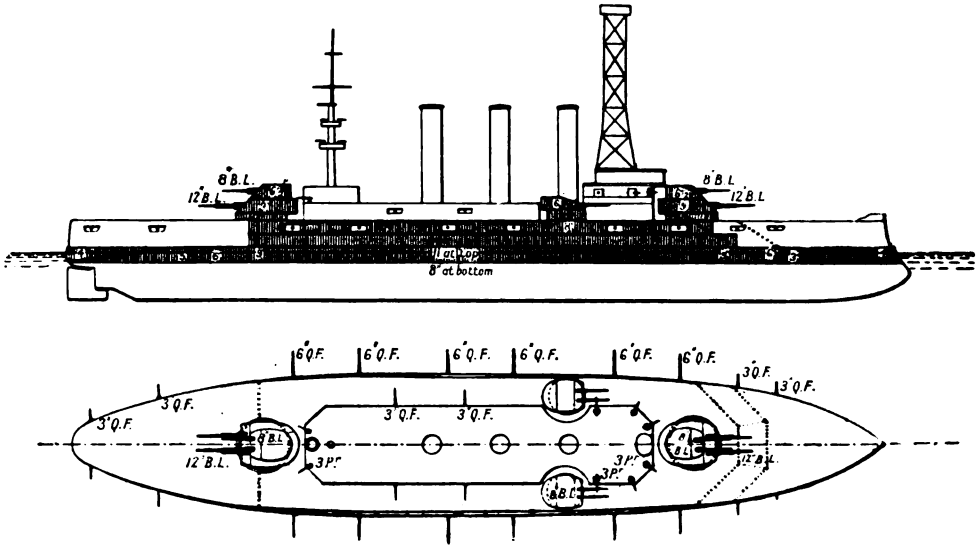
UNITED STATES.

BATTLESHIPS.

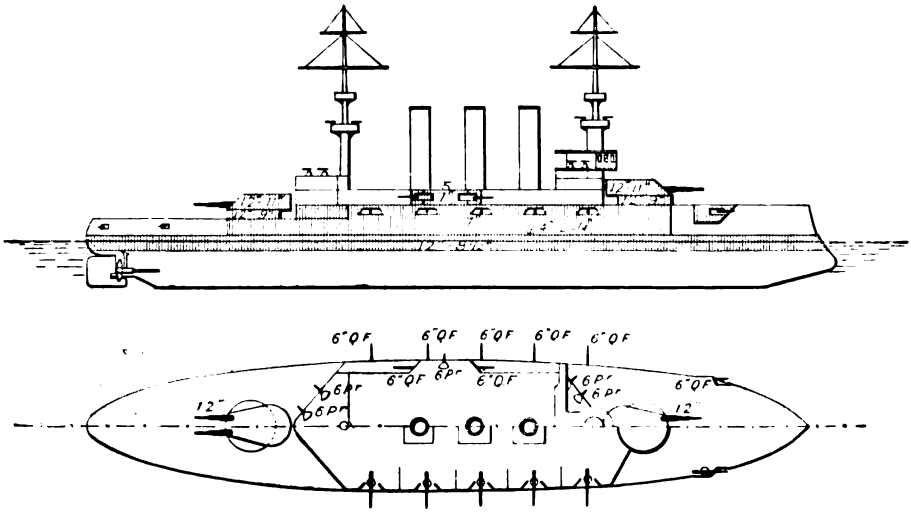
Georgia. **Nebraska.** **New Jersey.** **Rhode Island.** **Virginia.**



Length, 435 ft. ; 14,948 tons ; Speed, 19—19·4 knots ; Completed, 1905-1906 ;
Armament, 4—12 in., 8—8 in., 12—6 in., 12—3 in., 30 small.

See page 255.

Maine. ***Missouri.** *** Ohio.**



Length, 388 ft. ; 12,300—12,440 tons ; Speed, 17·8—18·1 knots ; Completed, 1902-1904 ;
Armament, 4—12 in., 16—6 in., 6—3 in., 18 small.

* Have one lattice tower.

See page 256

PLATE 66.

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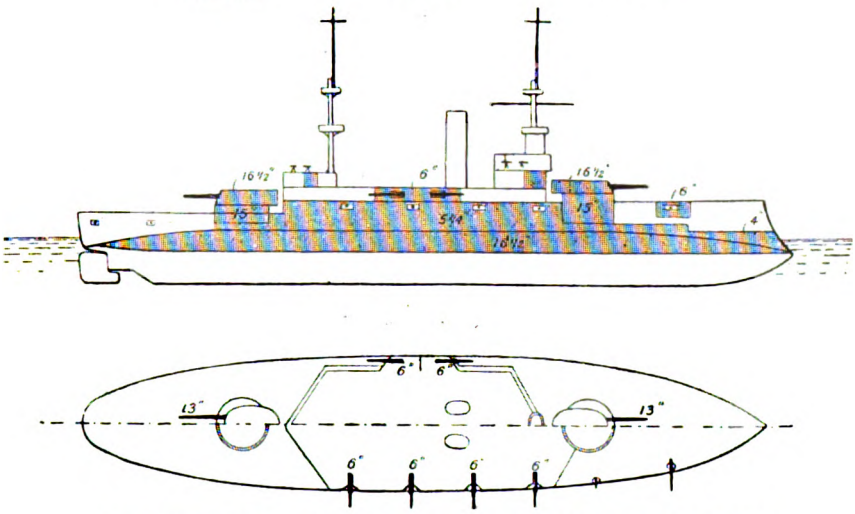
UNITED STATES.

BATTLESHIPS.

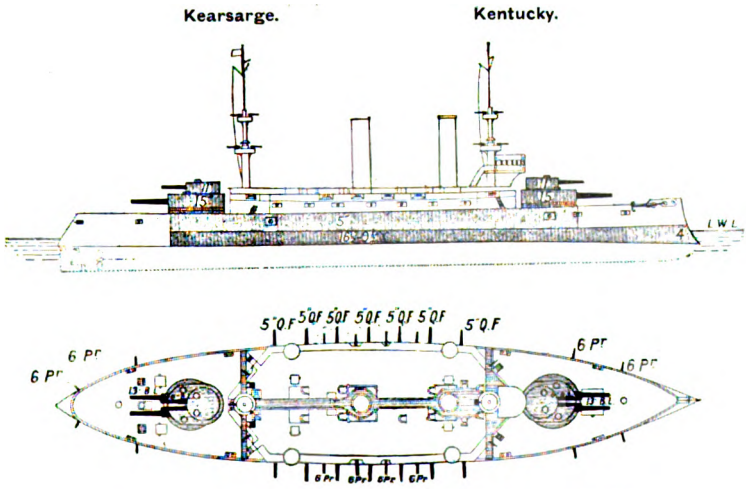
Alabama. **Illinois.** **Wisconsin.**



Length, 368 ft. ; 11,565—11,653 tons ; Speed, 17—17·45 knots ; Completed, 1900–1901 ; Armament, 4—13 in., 14—6 in., 24 small.

See page 255.

Kearsarge. **Kentucky.**



Length, 368 ft. ; 11,540 tons ; Speed, 16·8 knots ; Completed, 1900 ; Armament, 4—13 in., 4—8 in., 14—5 in., 34 small.

See page 256.

PLATE 67.

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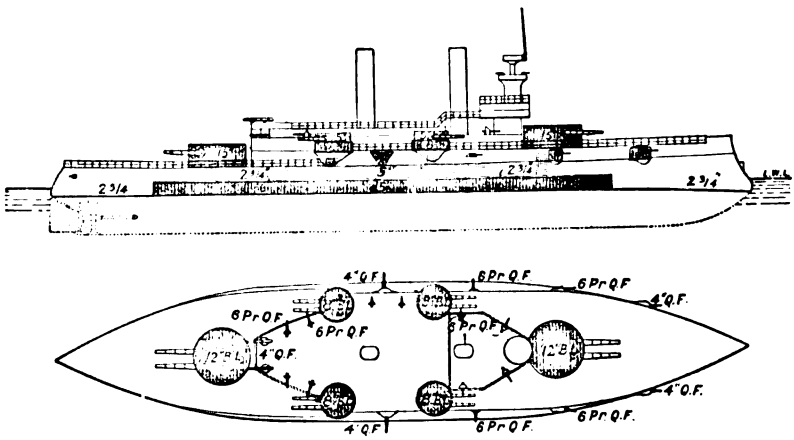
UNITED STATES.

BATTLESHIP.

Iowa.

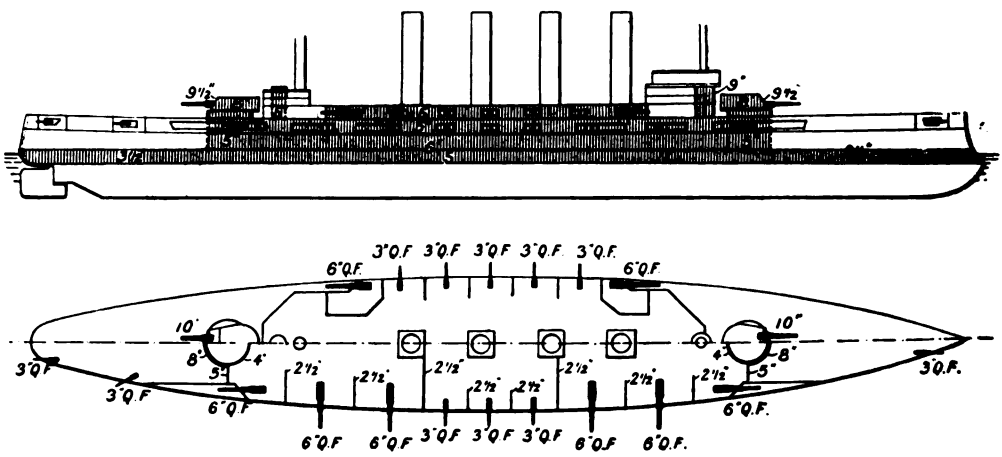


Length, 360 ft. ; 11,340 tons ; Speed, 17·1 knots ; Completed, 1897 ;
Armament, 4—12 in., 8—8 in., 10—4 in., 12 small.

See page 256.

ARMOURED CRUISERS.

Montana. North Carolina. Tennessee. Washington.



Length, 502 ft. ; 14,500 tons ; Speed, 22—22·8 knots ; Completed, 1906-1908 ;
Armament, 4—10 in., 16—6 in., 22—3 in., 22 small.

See page 256.

PLATE 68.

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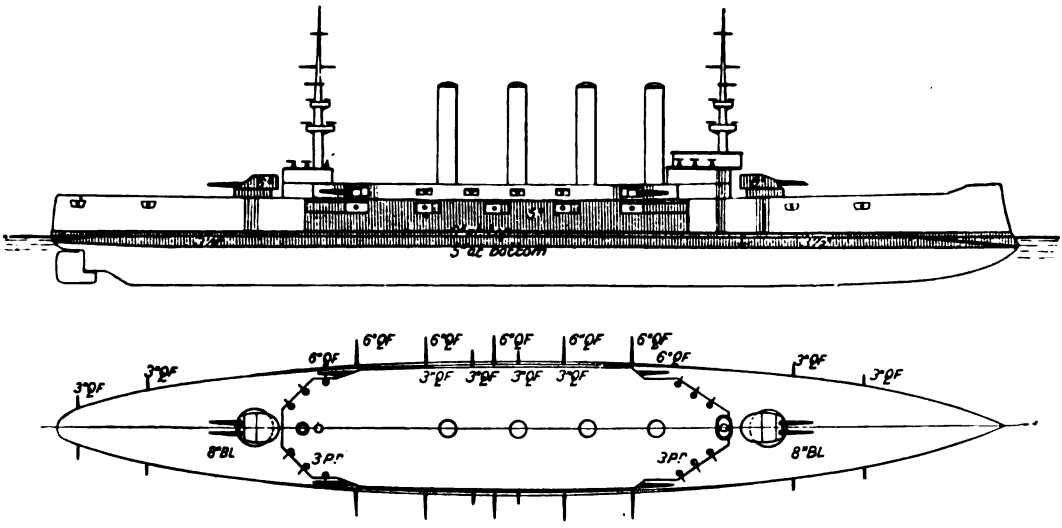
UNITED STATES.

ARMOURED CRUISERS.

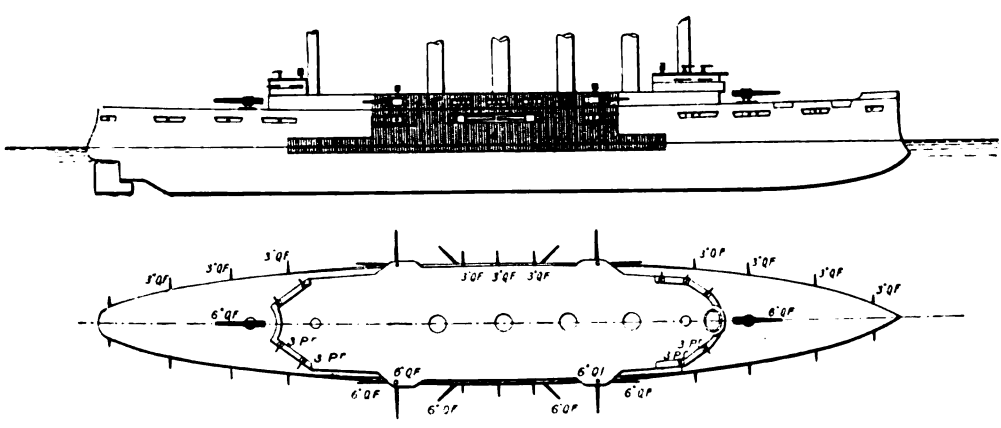
California. Colorado. Maryland. Pennsylvania. South Dakota. West Virginia.



Length, 502 ft. ; 13,680 tons ; Speed, 22—22·4 knots ; Completed, 1905-1907 ;
Armament, 4—8 in., 14—6 in., 18—3 in., 30 small.

See page 255.

Charleston. Milwaukee. St. Louis.



Length, 424 ft. ; 9700 tons ; Speed, 22—22·3 knots ; Completed, 1906 ;
Armament, 14—6 in., 18—3 in., 36 small.

See page 255.

PLATE 69.

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PART III.

ARMOUR AND ORDNANCE.

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PART III.

ARMOUR AND ORDNANCE.

British progress.

DEVELOPMENTS in the production of war material and its application continue, progress is never arrested, and the struggle between the agencies for the attack and protection of ships is unending. Since the last issue of the *Naval Annual* there have been many notable advances in guns, projectiles, armour, and many other appliances connected with the science of gunnery. There is no reason for supposing that this country does not still lead the way, in spite of keen competition everywhere. Limitation to guns of one calibre is, if anything, more than ever since the Dreadnought was put afloat, a marked feature of the principal battery of armour-protected ships. The greater accuracy and striking energy at long ranges, now demanded, point to the employment of heavier guns for this battery, with armour-piercing projectiles carrying larger bursting charges. While, too, there is not such marked uniformity of practice in regard to the secondary or anti-torpedo battery, the trend of professional thought in this direction appears to be concerned less with the use of this battery for exercising influence in a Fleet action than with its primary purpose—the effective disablement of destroyers or other vessels using torpedoes. Thus, while opinion generally is against the multiplication of calibres as inexpedient, since the effect of larger guns is greater and more destructive at medium ranges, and objectionable, as diminishing efficiency of fire-control, the weight and power of the anti-torpedo battery tends to increase, and there is a decided leaning towards placing it behind armour. In projectiles, considerable headway has been manifested, those now being employed having long hollow caps to increase their length and thus maintain velocity at long ranges, while thin coatings of aluminium or copper have been suggested to lessen erosion. In the arrangement of the heavy battery, the return to the centre-line disposition, which was indicated as likely in earlier issues of the *Naval Annual*, has now taken place. In no one direction can it be said that the naval authorities or their associated allies, the inventors and manufacturers, have been standing

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still, for in every branch of the industries connected with our resources for supplying war material for use afloat the development and advance have been important and striking.

Heavy guns.

In armour-protected vessels of the latest designs, the tendency seems to be to increase the individual power of the heavy guns rather than to add to the number carried in each vessel. The only Power which is reported to be mounting more than 12 guns of large calibre (12-in. and upwards) in battleships is Italy, the Conte di Cavour and her two sisters being credited with an armament of thirteen 12-in. guns, partly mounted in triple turrets. None of these vessels, however, has yet been put afloat. In the other direction of guns of increased power, Great Britain established a lead by deciding to equip the Orion and Lion with a new 13·5-in. weapon. Ten of these guns will be mounted in the former vessel, and eight in the latter, while in each case they will be in twin-turrets on the centre line of the ship. Both these important developments were foreshadowed in the *Naval Annual* for 1910. The Orion and Lion were both launched last year, but no other Power has a ship in the water carrying a heavier gun than the 12-inch.

In America the same practice obtains as in Great Britain, and the new 14-in. gun of 45-calibres is being mounted in the Texas and New York, of the 1910 programme. Possibly the advent of the British 13·5-in. gun had something to do with the adoption of the American 14-in. gun at the present juncture, as it was only in January last that the Arkansas, the first ship to have the 12-in. 50-calibre gun, was launched, and this ship moreover carries two additional 12-in. guns to the Delaware and Florida types. In accordance with the usual practice in the United States, the 14-in. guns of the Texas and New York will be mounted in one fore and aft line.

In Germany the armament of the ships in the third quartette of battleships of the Dreadnought era—of which the first vessel, the Kaiser, was launched on March 22 of this year—will, it is reported, consist of ten 12-in. guns, but a 14-in. gun is also mentioned, and this gun will almost certainly be mounted in the fourth quartette. Although the reported armament of the Kaiser is less than that of the Helgoland class, which have twelve 12-in. guns, it is understood that the broadside fire has been augmented by the adoption of the centre-line principle of the British and American designs.

The French have apparently decided to arm their second pair of one-calibre gun battleships in the same manner as the first pair, the Jean Bart and Courbet—that is to say, with twelve 12-in. 50-calibre guns, of which ten will be able to fire on either broadside. This armament is the same as that of the Japanese Kawachi and Settsu,

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but the broadside of the latter, it is understood, consists of eight guns only, owing to the disposition being similar to that of the earlier German "Dreadnoughts," which have only two turrets on the centre-line.

In Italy the triple-gun turret has been adopted for the Dante Alighieri, which was launched in August of last year, this vessel being armed with twelve 12-in. 46-calibre guns in four turrets on the centre-line. The reported armament of the succeeding Italian "Dreadnoughts" is thirteen 12-in. guns, mounted partly in triple and partly in twin-gun turrets.

The new Austrian battleships will also be armed with 12 guns of 12-in. calibre, mounted in four turrets on the centre-line of the ship. In Russia, however, where the new battleships are to have twelve 12-in. guns, triple mounted, as mentioned in the *Naval Annual* last year, it is understood that only two of the four turrets are on the keel line, the remaining two being placed *en échelon* as in the British Invincibles. This, it is asserted, gives a right ahead or right astern fire of nine 12-in. guns as compared with three, without any reduction of the broadside fire.

It is an axiom in the science of gunnery that the power of the gun will constantly overtake the power of the defence, in whatever way the latter power may be provided. It is manifest that in connection with ships actually in the water there has been little or no increase in the defence so far as armoured positions are concerned. The thickest part of the belt is generally from ten to eleven inches, and there is the same amount of armour on the heavy gun positions, while in other navies than our own the anti-torpedo battery is sometimes protected by casemates 5-in. to 6-in. thick. Nor in those ships is there any striking improvement in the resisting power of the armour. Mr. Beardmore was reported to have said, at the launch of the Agamemnon, that the 8-in. armour of 1906 was more than equal to the 12-in. armour of 1902, but no similar advance has been made since that date. Why, then, have all the Powers that could do so increased the size and the power of the heavy guns? It is necessary to have a correct answer to this question in order to arrive at a just estimate of the probability of history repeating itself, as Sir William White thinks it will, so that in the course of a few years there will be a return to more moderate calibres. The cause usually assigned—the enormously greater destructive power of the shells of the heavier guns—is said to have been proved by experience gained in extended firing trials ashore and afloat. But if this is admitted to be the principal reason, there are others—the heavier shell does not need so high a muzzle velocity per foot-ton of striking energy; a lower muzzle

Advance in guns.

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velocity means less erosion in the bore and a shorter gun, while there is always to be considered the possibility in the immediate future of armour with a greater resisting power to be attacked. Anyway, all the Powers are now moving in the same direction. They appear to have realised at last what has been known in this country for some time, namely, that armour-piercing shells containing a very large bursting charge are far more effective in destroying a battleship than the old pattern armour-piercer which has hitherto been in use on the Continent. Great Britain led the way from a 12-in. of 45 calibres, as mounted in the Dreadnought, to a 12-in. of 50 calibres, as mounted in the St. Vincent, and now to a 13·5-in., such as will be mounted in the Orion. In America a similar movement has taken place, and while 14-in. guns will be mounted in the New York and Texas, an experimental 16-in. gun is said to be nearly ready for trial. They have already a 16-in. gun for coast defence. The same thing has happened in Germany, where they have progressively advanced from 11-in. to 12-in., and a 14-in. gun similar to that already in use for coast defence is mentioned in connection with the latest ships. The ballistic capabilities of all the latest guns appear to be about the same, although there are small differences in calibre, in weight of gun, and shell. In this country, owing to improvements in the system of mounting and in the controlling machinery, the guns of increased weight are worked with the same ease and handiness and the rate of fire is about the same as that of those of lesser calibre. While also the mounting is stronger, it has been found possible to effect this without increasing the diameter of the turret.

Improvements in material.

While it is indisputable that developments in the methods of gunnery have been most marked and interesting during the last few years, the developments in material have been no less important. The improvements in the range-finders in use have been conspicuous, and all the other instruments used in fire-control show similar advances. Probably the most obvious of all the improvements now adopted have been those in connection with the handling of the heavier guns. Whereas with the mounting of ten years ago, such, for instance, as will be found in a ship of the Majestic class, it would be impossible to keep a 12-in. gun laid through a roll of so little as, say, three degrees, with a modern mounting a 12-in. or 13·5-in. gun can be kept accurately laid through a roll of greater extent with consequently far greater rapidity. What this means in the possibilities of accurate fire in a seaway is, of course, manifest. In the smaller gun-mountings there have been many improvements introduced, all tending to steadiness of platform, as little disturbance

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as possible of the aiming numbers, and more efficient sighting gear. It is not easy to see to what degree the size and power of the guns will advance. The 13·5-in. seems destined in its turn to give way to a 15-in. or 16-in. gun, but on the other hand there is also a possibility of the pendulum swinging back to the 12-in. 50-calibre.

British and foreign guns.

From time to time a good deal of controversy is carried on in technical and other papers concerning the comparative merits of guns of the Continental system of construction and the British system. It is not curious that on the Continent attempts should be made to depreciate the quality of British guns or their system of manufacture, but it is surprising to find the representatives abroad of papers in this country following this example and accepting as authentic everything which is reported about the superiority of foreign ordnance. The Germans have great confidence in their guns, but it is none the less permissible to think that some misapprehension underlies this deduction. Moreover, in addition to a proper pride in their own guns, it may be remembered also that there is a foreign market for war material, and it is no new thing in commercial rivalry to depreciate the wares of a competitor in the same line of business. In any case, it is not without reason that the German papers, when reporting the achievements of the Krupp factory, almost invariably accompany these reports with inaccurate and detracting statements regarding British ordnance. But the English press might at least be a little more cautious in accepting such statements, even if their publication be intended to spur our own officials and manufacturers to increased efforts.

The arguments usually set forth in favour of the Continental system are the alleged superiority of these weapons, due to their lightness, the special material from which they are made, and the high ballistics obtainable, which, when expressed in the form of foot-tons muzzle energy imparted to the projectile per ton of gun show a superiority in favour of the Continental system. Were this the only point worth consideration, the matter might be allowed to drop there, but as this is only one of the very many important considerations to be borne in mind in gun design and construction, a few remarks here on the subject may be of interest.

In the first place, it may be observed that one of the most direct outcomes when high ballistics are obtained from a light gun is that a greater velocity of recoil is communicated to the gun, and that this must be suitably resisted. On the assumption that the lengths of recoil are nominally the same for light and heavy guns of the same calibre, then it stands to reason that the force to be resisted is much greater in the case of the light gun than in the case of the heavy

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gun, which is just another way of saying that the weight of the mounting must be considerably increased owing to this extra force; and moreover, this not only affects the mounting, but also to some extent affects the construction of the ship on which such a mounting is placed, and adds a certain amount of weight not only to the mounting, but to the ship also in consequence. It will be apparent, therefore, that the amount saved on the weight of a gun is not so much less weight to be carried on the ship. The correct comparison, therefore, to arrive at right conclusions is to compare the foot-tons energy per ton, not of gun only, but of the total installation.

As the size of the barbettes is a matter of considerable importance where such are constructed of heavy armour, it will be readily appreciated that to increase the lengths of recoil of guns in order to lessen the stresses on the mounting, is to add still further to the weight of the mounting where such increase necessitates a larger barbette; in fact, the expedient is sometimes adopted in the British practice of making the guns even heavier than necessary at the breech end in order to bring the centre of gravity to the rear and so effect a reduction in the diameter of the barbette armour, thereby saving more on the weight of the mounting than is added to the weight of the gun in consequence of the increased diameter at the breech end. Of course, in considering these features, it should be borne in mind that the above remarks are made on the assumption that the depths of the barbettes are practically the same, and that the weight of a deep barbette is not being compared with a dwarf one, which, of course, affords much less armour protection.

Ordnance manufacture.

In comparing the systems of gun construction—that is to say, the steel system as compared with the steel and wire system—of course, it is universally admitted that the wire gun has the advantage in circumferential strength, and the chief advantage of the wire-wound system is that uniformity of stress is obtainable throughout the whole of the material employed in the gun structure to an extent that is impossible in a gun built of steel hoops only, according to the Continental practice. When the wire system is used in combination with the solid steel inner tubes and outer covering, long experience has proved that guns can be made thoroughly stiff longitudinally, and not in the least defective as is sometimes urged by those favouring the Continental construction. Weight for weight, therefore, the maximum stresses being the same, a gun constructed of steel and wire is of much more efficient construction, and the uniformity of stress throughout the whole mass of the gun, which is obtained by the wire being wound on at the theoretical tension necessary to obtain from every layer the maximum resistance when the gun is fired, is a very

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great feature in favour of this construction. Other strong points may be urged in favour of the wire construction, such as the much higher breaking strain of wire as compared with the best gun steel which it is possible to have in the solid steel construction. The regulation of the initial tension on successive layers of the wire during construction, and the full effect of this reinforcement, is obtained to a degree that is not possible to get by shrinkage. It will therefore be seen that the gun of steel and wire construction, as used so extensively in the British service, is stronger and better able to resist the great radial stresses due to firing than is a gun of solid steel construction of the same weight, and moreover it is safer in the event of accident and is much more easily repaired.

Anti-torpedo battery.

Questions connected with the secondary or anti-torpedo battery continue to be discussed, and there is considerable diversity of opinion and practice about the number and calibre of the guns, their disposition in the ship, and whether they should or should not be behind armour. It seems to be regarded as possible in some navies that the larger calibres of about 6-in. might be used effectively in fleet actions. It is argued that the small number of hours of good daylight, and the high percentage of dark and misty days, will make firing at the longest ranges on many occasions of battle an impossibility; and that in all circumstances the high standard of accuracy required for hitting at those ranges—accuracy not only in gun laying, but in fire control—makes it more than probable that the tendency in the future will be to close more rapidly to shorter ranges in action. Such reasoning has already had the effect of promoting improvements in mountings, communications, etc., so that more rapid rather than more distant firing tends to become the chief tactical objective. Whether it will be wise to increase the calibre of the guns of the torpedo repelling battery for this subsidiary object is another matter. It is beyond a doubt that a 6-in. gun can be fired more quickly than 13·5-in., but at 4500 yards, and this is the inside range, the effect of many 100-lb. projectiles against almost any part of a battleship is not to be compared with that of the 1250-lb. shell thrown by the larger gun, for as the range decreases so the probability of hitting with the big gun will increase, and its power to inflict damage. Again, the objection to a multiplication of calibres weighs just as heavily in connection with the torpedo defence battery as it does with the primary battery. Probably, both for the purpose of repelling torpedo attack and for supplementary use in fleet actions, a 6-in. calibre gun will be found eventually to be the most effective, but for some time the actual gun used will vary with the trend of professional opinion in each country, and in those where the use of this battery in fleet action is

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deemed more important, the size of the gun will increase, they will be fewer in number, and guns of still smaller calibre will be mounted to make up for this deficiency.

Protection for torpedo defence guns.

The next question is whether this anti-torpedo battery should have a reasonable amount of armoured protection, and what amount in the circumstance is reasonable? To the last question, the usual reply is that the armour should be thick enough to supply protection against guns of similar calibre. As a rule, this is just the thickness which will give to the projectiles of the heaviest guns the requisite amount of resistance to ensure their bursting with the greatest possible effect.

The practice in regard to the anti-torpedo battery is very different in different navies. In the British Fleet, nothing heavier than a 4-in. gun has yet been mounted for this purpose, but it is claimed that, except in weight of projectile and bursting charge, this gun will compare very favourably for effective use with the old 6-in. gun. Nor has it become the practice in our Navy to mount these guns behind armour, although this has been suggested, and even reported as likely. The Americans have advanced from 3-in. guns in the Michigan to 5-in. guns in the Arkansas, from 20 to 22 of these guns being mounted behind 5-in. armour. The Germans have hitherto held to two calibres in their battleships—5·9-in. guns behind armour of a similar thickness, and 3·4-in. guns on the superstructure. It is reported that in the later vessels a 6·7-in. gun will be mounted, and even an 8·2-in. gun, throwing four 309-lb. projectiles a minute, has been mentioned as possible. The Japanese have a similar armament of 6-in. and 4·7-in. guns in the Kawachi and Settsu, but whether these are all to be behind armour is uncertain. The French and the Italians, like the Americans, have been content with 5·5-in. guns in this battery, and some of these guns are mounted in a casemate and some in turrets. In many cases, the disposition of these guns has been criticised as either too exposed, too concentrated, or too low in the ship for effective use in a seaway. The problem of the secondary or anti-torpedo battery is further complicated by the necessity for disposing the guns in such a manner as not to interfere with the arcs of training of the heavier guns. Generally, it appears to be thought that, given sufficient stopping power in the projectile as against destroyers, rapidity of fire is more valuable than penetration of armour, while protection, which is manifestly inadequate against the heaviest guns, is more or less wasted weight.

There are signs of a more general agreement upon the centre-line method of disposition of the main battery of guns in armoured ships.

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In the Neptune, Colossus, and Hercules, as described in the *Naval Annual* of last year, a compromise has been effected, the wing turrets being diagonally placed, or *en échelon*, while the middle turret on the centre-line is raised to enable the guns to fire over the after turret. By this arrangement all the guns can fire on the broadside, six right ahead and eight right astern. In the Orion and her sisters, all the five turrets have been placed on the centre-line, but two are raised to give their guns a higher elevation, in the one case over the bow and in the other over the stern turret. This arrangement gives ten guns on each broadside, but only four ahead and astern. There is here a great loss of end-on fire, although not so much as might be imagined, since in practice at a relatively small angle from the end-on position the guns of the centre turret can be brought to bear upon a target ahead, and the loss of right-astern fire is not so important. Moreover, all the guns have a better arc of training than when placed in diagonal turrets. At the time of writing, according to the latest reports, the German Kaiser (Ersatz-Hildebrand) and her sisters will carry their guns in the main battery on the centre-line, but if so, this will be a great departure from their earlier practice. The four Nassaus and four Thüringens each have their eight turrets disposed, two on the centre-line, one forward and the other aft, while the remaining four are arranged at the corners of an armoured citadel. Although, therefore, carrying 12 guns, they can fire no more in any direction than the Dreadnought, with only ten. The idea seems to have been that it might be necessary to engage on both sides at once, or that if a turret was disabled on the fighting side the other side might be turned to the enemy. In either case, the assumption would appear to be that the ship may or will not be able to choose her own position for fighting. It cannot be considered strange if they have now decided upon a plan which permits of a better utilisation of the armament.

Disposition of heavy guns.

The earlier German method has also been chosen by the Japanese for the disposition of the guns in the Kawachi and Settsu, but they are also said to have abandoned this plan in the new cruiser building at Barrow for the centre-line system. The Americans have never diverged from the method of placing all the big guns on the centre-line, which they followed when they increased the number of guns from four to eight. It is the Italians who have struck out a new line in this matter. In the new ships the triple-gun turret has been combined with the centre-line method. There is no difficulty in arranging for the placing of three 12-in. or 13·5-in. guns in the same turret, but the question arises whether two or three guns are preferable, and this is one for the practical gunner to decide. It is

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only when practical experience has been obtained in actual service that any useful opinion can be expressed upon the relative merits of the two systems. In the Conte di Cavour the Italians are reported to have used both systems, having the bow, centre and stern turrets with three guns in each and the two intermediate turrets with two only, these turrets being raised so that the guns may have a higher range of fire. Thus, while the Dante Alighieri can fire three guns right ahead and three right astern, with 12 on the broadside, the Conte di Cavour will have an end-on fire in either direction of five guns, and 13 on the broadside. The Austrians and Russians are said to have planned their ships in a similar manner to the Dante Alighieri, but in the *Taschenbuch der Kriegsflotten* the centre turrets of the Russian ships are placed diagonally, thus increasing the end-on fire; if, however, this plan was ever contemplated it now appears to have been abandoned. The French system differs from all the rest, although it is not unlike the disposition of the guns in the Argentine ships. Four turrets are on the centre-line, two raised to obtain a more elevated fire, and the other two turrets are placed abreast of one another on either beam. This plan gives a ten-gun battery on the broadside for 12 guns carried, and eight ahead or astern. It gives two guns less on the broadside than in the Argentine ships, where the wing turrets are placed *en échelon*.

Which of these methods is the best it is impossible yet to decide; there are obvious advantages in the centre-line system in arranging magazines, the distribution of weights, and perhaps in giving protection, yet the advisory committee which selected the Dreadnought is said to have considered the plan and decided against it. There is some objection, no doubt, to placing the turrets at such a height above water as is found in the North Dakota and Delaware, and the Americans have reduced the height in the Arkansas and Wyoming. On the other hand, the wing turrets give a superior end-on fire only to be obtained in the middle line system by triple gun turrets. The sacrifice of end-on fire is, however, probably exaggerated, the gain in other directions by abolishing the side turrets giving ample compensation for any such loss.

Control positions.

In March some instructive trials were carried out in the Neptune before she became the flagship of the Home Fleet. The object of the experiments was to test an improved and amplified system of director firing, for which Vice-Admiral Sir Percy Scott, who was present at the trials, is responsible. Hitherto the guns have been automatically laid for elevation by the officer in the control position, but by the new arrangements the lateral direction of the guns is in his hands also, thus conducing to a more rapid and accurate concentration of fire.

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Nothing has officially transpired as to the nature of the appliances used, nor have any details of the firing been published, but the result of the test was reported to be satisfactory and encouraging.

The alleged tendency on the part of naval men to abandon the control position aloft in favour of placing it in an armoured structure designed for the purpose appears to have had its origin abroad. The latest German ships are not fitted with fire-control positions aloft, and the natural supposition is that the Germans do not control fire by observation of the fall of shot in the same way as it is controlled in the British and other navies. It is a simple matter to fit the control position either in a conning tower, or even in one of the gun turrets, and it is possible even to use some kind of periscope arrangement by which the observer, stationed behind armour, can see apparently from a point aloft the result of each shot. But it does not seem to be a very efficient method of observation. If the position aloft sacrifices protection to the extra command obtained, the armoured position sacrifices command to protection. In the *Times* Engineering Supplement of November 30, 1910, the following remarks appeared upon fire-control in German battleships :—

> In view of the elevated control platform being in an exposed position, and thus liable to disablement in action, experiments have been conducted by the German naval authorities for the purpose of testing a series of inventions whereby the main fire control can be operated from a station situated amidships beneath decks. At this station, by means of an arrangement of tubes fitted with special prisms and commanding all quarters of vision, images are formed on parabolic reflectors. It is claimed that the distances are exactly determined by special contrivances and calculations. Supplementary telescopic tubes on each side of the ship, fitted with total reflection prisms, are placed just above the load water-line, and similar prisms at the station end of the tubes allow the officer in charge free vision over a limited distance of objects in the locality. It is said that the disposition of these tubes, originating from a system employed in the German submarines, has been determined by exhaustive research, and that the more protected position of the central station retains to the commander of a ship in action most of the advantages of an exposed mast-platform and conning tower in regard to fire control and navigation. It is reported that the system will be introduced into the battleships and cruisers now building.

It has long been rumoured that the Germans have made great advances in the matter of periscopic observation in its application to fire-control. They may, indeed, have achieved a certain amount of success with some system of observation intended to replace the elevated and exposed control positions to be found in the ships of most navies. So far, however, it does not appear that any actual installation of the kind has been fitted in any ship, German or other. What is quite probable is that such positions might be fitted eventually as alternative and additional to the more commanding post upon the mast. If such were the case, the guns would no doubt be controlled from aloft at the more extreme ranges, the observers descending to the protected positions as the vessels closed.

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Trellis towers.

The trellis towers adopted in the United States Navy have not at present been copied in any other fleet except the Argentine and the Russian, where it appears they are to be used in the new battleships. They have their advantages chiefly in the direction of weight saving, the difference in this respect between them and the heavy tripod masts in the British Navy being considerable. It is understood, however, that the American experience has been that a large movement occurs at the height of the control platform, which interferes so seriously with the control work that there is a possibility of these towers being discontinued in the latest ships. While it is true that the appearance of the trellis tower is much better than that of the tripod mast, at the same time the extent of the base of the former is often so great as to cause serious inconvenience to the deck arrangements.

Breech mechanism.

In the *Naval Annual* of last year we illustrated a system of semi-automatic breech closing for guns of a larger size than have hitherto been used in this type of mechanism. This the Vickers Company have considerably improved by a new arrangement of hand lever. This hand lever, which is only slightly larger than is usual for a block mechanism, contains the main spring, which returns the block to its closed position after being loaded.

In semi-automatic action the effect is precisely the same as that of all types of this class of mechanism—that is to say, when the gun has been fired and recoils, a pawl on the cradle slips into a position in which it can engage with a cam on the axis of the operating parts of the breech block, and when the gun runs out, the pawl engaging with the cam rotates a crank which withdraws the breech block away from the chamber of the gun, and operating an extractor automatically ejects the case. The breech block is held in open position by suitable projections on the extractors, and is liberated from the breech block by the rim of the cartridge case engaging with the lips of the extractor on loading.

The actuating gear which, as already stated, is in the hand lever, consists of a strong actuating spring, which is interposed between a rack and the rear end of the casing on the hand lever. The rack is in engagement with the toothed segment formed at one end of the axis pin of the crank and hand lever. A spring catch in the handle of the lever secures it to the gun. To work the gun for quick firing, the hand lever is grasped, the catch is released from the gun, and when the hand lever is swung open, it carries with it the rack which, being engaged with the toothed segment, gives the latter, and with it the spindle and crank, angular movement, thus withdrawing the breech block to one side. In closing, the operation is equally simple,

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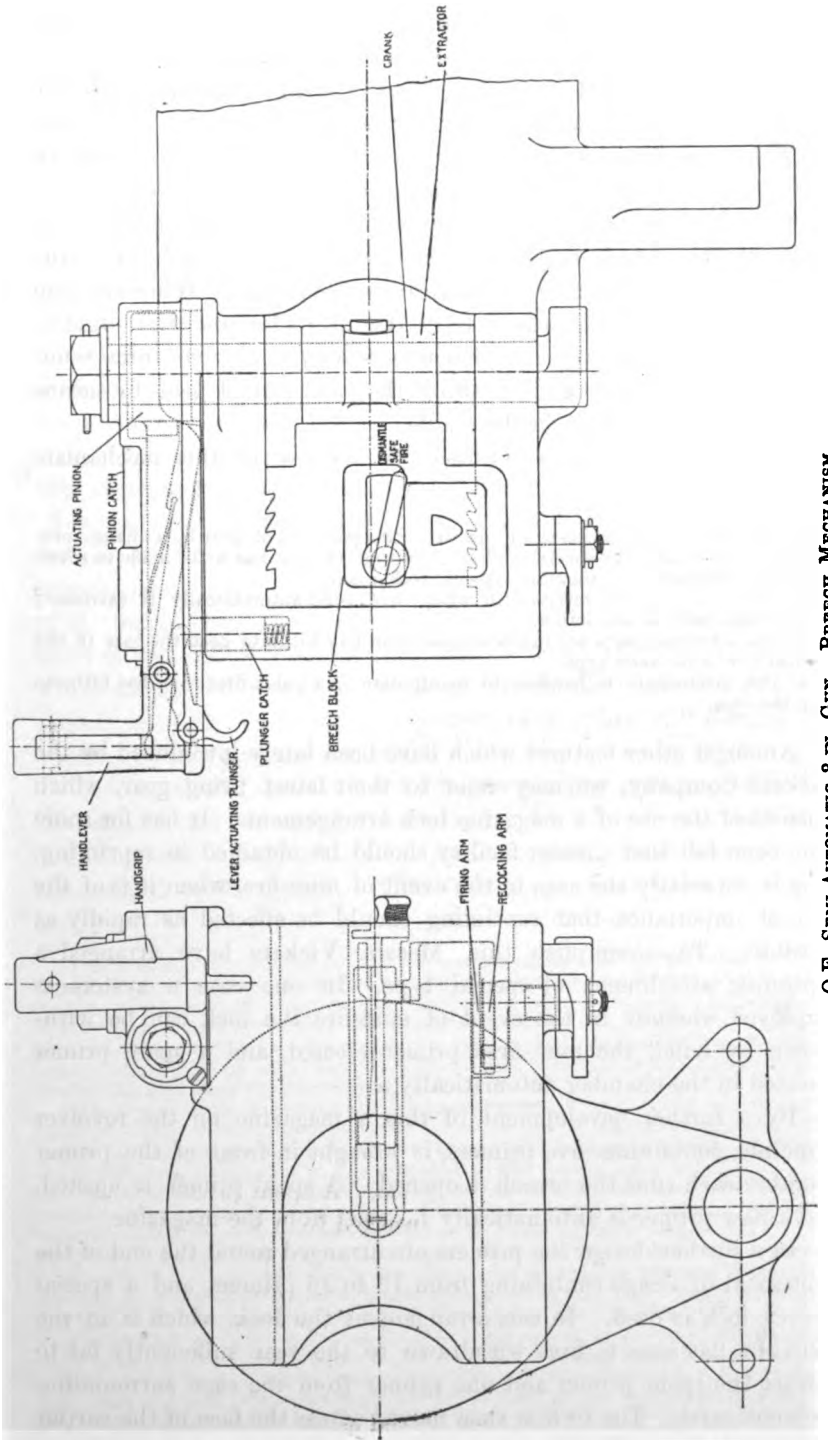

Q.F. Semi-Automatic 3-in. Gun. Breech Mechanism.
Messrs. Vickers, Ltd.

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the spring being in itself powerful enough to thrust forward the rack and with it the toothed segment and spindle; but to avoid any possibility of the block not going forward, owing to a stiff cartridge case, a special catch has been added, which engages with a slot in the toothed segment and relieves the spring, thus enabling the axis to be rotated positively without using the spring.

When the mechanism is opened to be used afterwards for semi-automatic, the block is held open by the extractor, and when the handlever is closed it thereby compresses the spring. When the gun is loaded the block is released from the extractor and the urgency of the spring closes it. All that is necessary to change from semi-automatic to quick-firing is to throw the pawl out of gear by means of a change over switch on the cradle.

The chief advantages obtained by the use of this mechanism are:—

1. That with the exception of throwing the pawl out of gear by a change over switch on the cradle, no special action or change of gear has to be made to revert from semi-automatic to quick-fire type of mechanism.
2. The action of the mechanism when used semi-automatically is extremely regular, especially in extraction.
3. The actuating parts are much simpler than has hitherto been the case in the vertical semi-automatic type.
4. The mechanism is handier to manipulate as a quick-firer than has hitherto been the case.

Amongst other features which have been lately introduced by the Vickers Company, we may refer to their latest firing gear, which consists of the use of a magazine lock arrangement. It has for some time been felt that greater facility should be obtained in repriming. This is especially the case in the event of miss-fire, when it is of the highest importance that repriming should be effected as rapidly as possible. To accomplish this, Messrs. Vickers have arranged a repriming attachment of special type. In one case a system is employed whereby in the event of miss-fire the lock can be withdrawn by hand, the miss-fired primer ejected, and a spare primer inserted in the chamber automatically.

By a further development of this, a magazine on the revolver principle, containing five primers, is brought in front of the primer chamber each time the breech is opened. A spent primer is ejected, and a new primer is automatically inserted from the magazine.

In a further design the primers are arranged round the end of the vent axial in a cage containing from 12 to 16 primers, and a special electric lock is used. In this arrangement the lock, which is in the form of a flat case, is first withdrawn to the rear sufficiently far to extract the spent primer and one primer from the cage surrounding the vent axial. The lock is then moved across the face of the carrier

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and during this action the spent primer is ejected and replaced by the new primer taken from the cage.

When the mechanism is closed, the new primer is brought in front of the primer chamber, and in the final movement of the mechanism the casing is pushed forward, inserting the primer into its seating. The primer cage during this last action is revolved sufficiently to bring another primer head into the groove in the end of the lock casing ready for withdrawal. This action is repeated until the supply of primers is exhausted.

Holmstrom Obturator.

In the *Naval Annual* for 1908 the Holmstrom Parallel Obturator Breech Mechanism was referred to and some particulars given. This mechanism, which is manufactured by the Coventry firm, has undergone further successful trials in 12-in. guns, and it seems likely that it may be adopted for the naval service. The ease of working of this mechanism is remarkable, the time of opening or closing the 12-in. breech mechanism by hand being under six seconds, after firing. No stiffness is experienced either in opening or closing the breech, owing to the enormous mechanical power obtained by means of the toggle levers, which are so arranged as to act at the commencement of locking or unlocking the breech block and when seating or withdrawing the pad. A new type of breech block, which is at present undergoing trials, is expected to simplify still further the working of this breech mechanism.

In the *Naval Annual* for 1908 photographs were reproduced of this mechanism as arranged for working by a hand lever, and it is now illustrated here as applied to a larger gun and worked by a hand-wheel or by power. The following description will be of interest:—

In this mechanism the breech block is partially drawn back after being unlocked so as to bring the obturator clear of its seat in the gun, and the distribution of power is so apportioned that it is not only a maximum when beginning to unlock, but is equally powerful when starting the obturator from its seat in the gun, the power being obtained in both cases by means of a toggle. The rearward pull on the breech block, being applied on both sides of the centre-line, is exerted in the most favourable manner for unseating the obturator.

The breech block is divided into twelve segments, nine of which are threaded, thus providing a shearing section of three-quarters of the circumference. The carrier for supporting the breech screw is hinged to a bronze end frame secured to the breech end of the gun, and is arranged to suit either right or left guns. The end frame carries ball bearings supporting the carrier, and worm gearing and attachments for the hydraulic motor shaft. The breech block is supported on the carrier by a cylindrical projection on which it is free to rotate and slide longitudinally. The vent, which passes axially through the breech block and carrier, has on its inner end a mushroom head, behind which are placed the obturating pad and discs; it is retained in position by a sleeve, spiral spring, collar nut and locking plate, and provided at its rear end with interrupted rings to take the box slide.

The arrangements for operating the breech are as follows:—The hydraulic motor shaft lying parallel to the gun axis is geared to the actuating worm by a pair of spur wheels carried in a casing forming part of the end frame, and this worm gears in turn with a worm wheel keyed on the lower part of the carrier hinge pin. On the carrier hinge pin is keyed a pinion, which through the intervention of an

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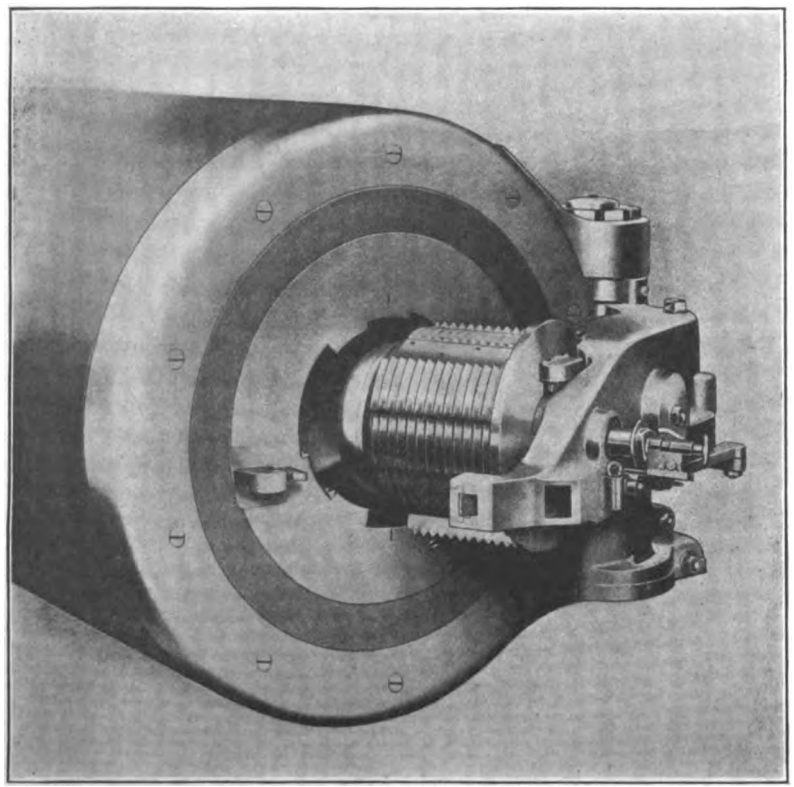
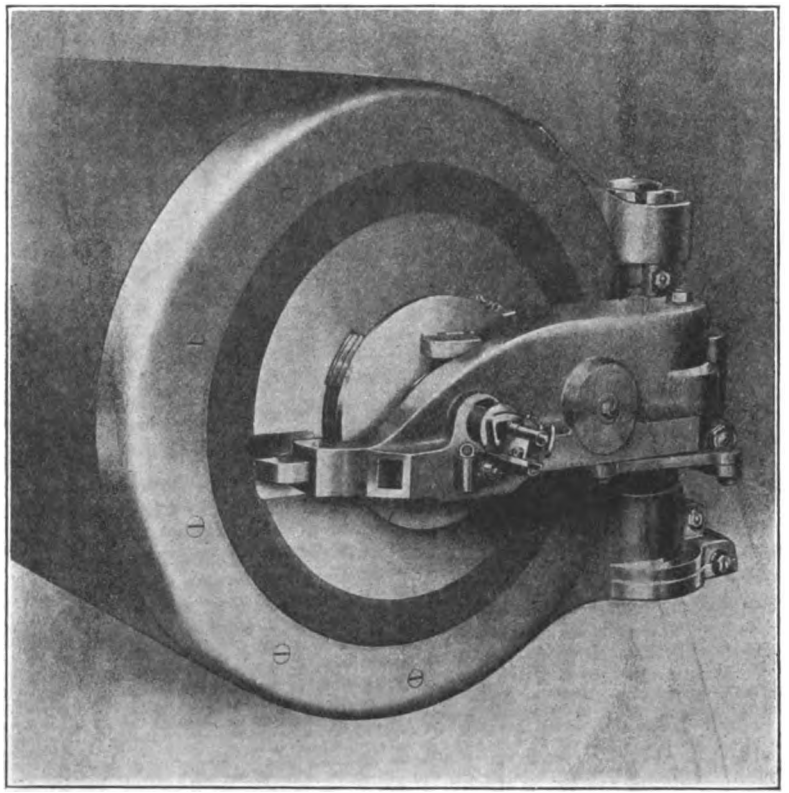


Breech Open.



Opening Breech.

HOLMSTROM BREECH MECHANISM,
As fitted by Coventry Ordnance Company to 12-in. Gun.

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intermediate pinion gears into the actuating pinion. On the axis pin of the latter is keyed the actuating crank, which is connected to the rack by means of a link, these parts forming a toggle giving great power. On the top side of the rack are teeth which gear with the unlocking pinion, the latter being keyed to the spindle of the unlocking crank, the spindle having a bearing in the carrier. The end of the unlocking crank is provided with a roller which enters a curved slot in the face of the breech block. On the inside of the rack are formed other teeth in which gears the withdrawing pinion, carried by a vertical spindle having a bearing in the carrier; on the top and bottom of this spindle are two withdrawing cranks, fitted with rollers, which rollers when the breech screw is unlocked engage with two cam grooves on the face of the breech block, one on each side of the centre line. The position of these cranks is such as to form a toggle joint giving great power at the moment of seating or unseating the obturator.

A catch is fitted to the left side of the carrier to hold it against the face of the gun when the breech block is withdrawn or pushed home. One end of this catch engages in a recess formed in a bracket on the face of the gun, and the other end butts against the flanges of the breech block until the latter is withdrawn, when the catch is free to move to the right behind the breech block flange, leaving the recess in the bracket on the gun, thus allowing the carrier to swing into the loading position. The shape of the catch and the recess in the bracket on the gun are such as to force the catch behind the breech block flange at the commencement of the swinging back of the carrier. On closing the breech the catch prevents the forward movement of the breech block, until it is again drawn back into engagement with the recess in the bracket on the gun, by means of a stud with an inclined face fitted to the gun, which enters a slot formed for it in the catch. Two grooves are cut in the rear face of the rack. The lower groove actuates a safety lever ring, for the purpose of withdrawing the striker on the first movement of the rack, and the upper groove swings the lock guide round its hinge bolt on the continued movement of the rack.

Separate electric and percussion firing locks are provided. These are constructed of few parts, and have very efficient safety arrangements. In the electric lock the firing needle is withdrawn within the lock before movement of the lock or breech block takes place, while in the percussion lock the needle is automatically withdrawn after firing. The percussion lock is automatically cocked on opening the breech block, and means are provided for recocking by hand, if necessary.

The 6-in. and 4-in. breech mechanisms are identical in principle to that of the 12-in., slight modifications in detail being provided to enable the mechanism being worked by a hand-lever. The complete locks and certain other parts of the mechanisms are interchangeable for all sizes of guns.

Electro-hydro fitting gun-sights.

Improvements are constantly being made in gun-mountings, all with a view to the rapid manipulation of the gun and to obtaining greater rapidity of fire. It is probable that this has now reached the maximum, there being no difficulty in obtaining a rate of fire of two rounds per minute from a 12-in. gun. The sighting arrangements have been brought to a great degree of perfection, insomuch that a modern gun-sight must be considered a highly scientific instrument and treated as such, otherwise the delicate mechanism and accurate adjustments which are now required become useless labour.

The tendency of the day in sighting is to concentrate the control of the guns into one or more positions. Messrs. Armstrong, Whitworth & Company have a revised system of sighting on the novel principle of employing electric-hydro apparatus for adjusting all the sights of the guns to the required range from such controlled positions. In the past few years the advance in gun-sighting has been very great, for whereas the sight had little attention paid to it, and a simple directing bar being considered sufficient, apparatus is now

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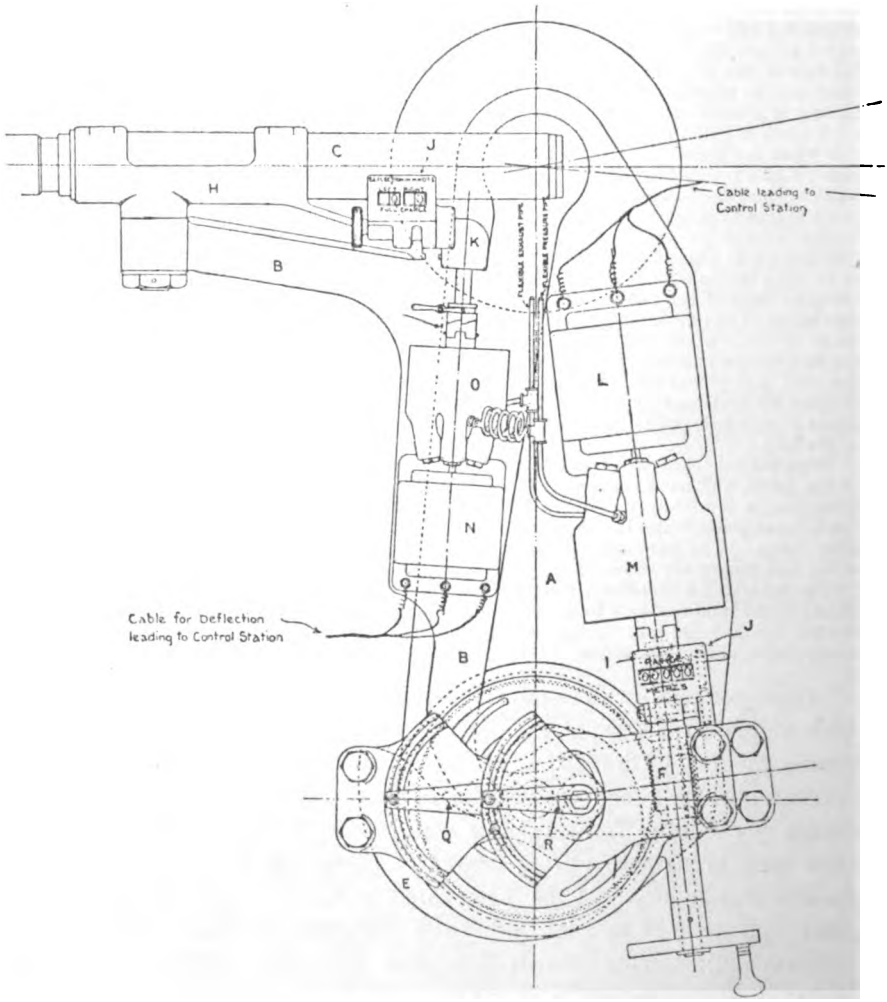
attached for correcting, more or less automatically, errors due to the wear of the gun, temperature of the magazine, etc.

Endeavours have been made at various times in recent years to obtain a satisfactory method of setting all the sights of a ship's main,



DESIGN OF SIGHT
Arranged to be worked from a central controlling station.
Sir W. G. Armstrong, Whitworth & Co., Ltd.

or secondary, battery from a central control station, but up to the present time without a great deal of success.

These attempts have been principally on two systems. The first system consists in driving each sight electrically by a motor placed on the sight itself, all the motors being synchronised, with the motor

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of the sending instrument, so as to make exactly the same number of revolutions. The second system consists in employing electric motors as before, but controlling their movements by some kind of hunting device—on the same principle as used in steam steering gear, except that the hunting arrangement is employed to make or break the electric circuit instead of to open or close a steam admission valve. Both of these systems present great difficulties.

The method adopted by Sir W. G. Armstrong, Whitworth & Company differs altogether from either of these, being electro-hydraulic.

To get enough energy to drive a massive sight for a heavy gun turret requires considerable power, and, unless a high speed can be employed, makes an electric motor a very large and heavy thing to place upon a sight. Accordingly, it was determined that hydraulic power should be used to do the actual work, with a very small electric motor to drive the valve of the hydraulic engine. This method has proved very satisfactory. A hydraulic motor of sufficient power has been designed, of which the valve can be easily worked, so that the electric motor required is kept a minimum size. Both motors are of novel design, so that a perfect step-by-step motion is obtained, ensuring absolute synchronism.

The sight is designed to give to each separate gun the different amounts of correction required for wear of the rifling, and also for variations in the atmospheric conditions (or temperature of charge, if necessary), although the movement communicated to the driving mechanism of each sight is the same for all.

The principle on which this gear is based is that of the cam control already embodied in all sights designed by the firm, but instead of merely affecting the pointer, or zero mark, on the sight, the arrangement of the gear is such that the corrections are actually added to or subtracted from the movement of the cam which controls the motion of the sighting telescope.

In the illustration C is the sighting telescope carried on a carrier, H, vertically pivoted to an arm, B, forming part of the elevating arm, B^1. The elevating arm B^1 is pivoted on a horizontal axis upon the main body of the sight, A. This portion A is in the form of a plate, and carries the whole of the elevating gear and motor, the deflection gear and motor being carried on the elevating arm, B. L is the electric motor driving the valve of the hydraulic motor, M, for elevating the sight. The range is recorded by a counter, J. The shaft driven by the motor, M, carries a worm gearing with a large worm wheel, which in turn drives the cam, E. By the rotation of this cam the arm B is caused to move through the required angle, carrying the deflection gear and telescope with it. The corrections necessary for each individual gun are obtained by moving the frame in the required direction.

The corrections are set upon the sight by means of the two index arms, Q and R, the one for corrections due to varying muzzle velocity and the other for corrections due to varying atmospheric conditions. The whole of the gear in connection with the elevating of the sight and the application of the necessary corrections is enclosed in a casing forming an oil bath, and a clutch, I, is provided for rapidly throwing the engines out of gear, so that the sight may be worked by the hand-wheel shown.

The arrangements for giving deflection are precisely similar, though the mechanism is simple. N is the electric motor and O the hydraulic motor for effecting the required movements. For elevation, a cable is led throughout the ship having branches to each gun-sight, and a similar cable is employed for deflection. The gear is so arranged that if the sights are left standing, set at different elevations or deflections, it is only necessary to work the sending instrument down to zero and then continue to turn the handle in the same direction. Each sight is then brought down to zero in succession. This being effected, a reversal of movement of the sender causes all the sights to rise together.

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Gun mountings.

As stated in the last issue of the *Naval Annual*, heavy barbette gun mountings of the largest type are now being made to their own design by the Coventry Company, and at the present time they have on hand the complete equipment in this class of mounting of two of the latest types of battleships, the Conqueror and Ajax. The following are some particulars of this mounting:—

The design is said to show marked improvements over previous types of mountings, ranging from the shield and the structural work down to the finer controlling gears and fittings. The principal feature of the gun-house is that it is built up wholly of curved plates, which, on account of the difficulties attending manufacture, have generally been avoided since the introduction of hardened armour. The allied armour plate makers who are interested in this company have now evolved methods of dealing with this class of armour which enable them to compete on an equal basis with the flat plated shields.

The structure in which the guns are mounted has also been considerably departed from in relation to previous types, owing to the introduction of new methods of meeting the various requirements, and the Coventry Ordnance Works have been able to give a structure of a considerably greater depth and general rigidity within the limit of the weights than has been possible hitherto. One of the main features tending to bring this about is the particular design of elevating gear, which acts at a long radius from the trunnion, and instead of the motion of the cylinder being in a horizontal direction it is moved to a nearly vertical direction. This enables a considerable binding together of the main girders beneath the slides to be carried out, which has hitherto been one of the great difficulties in heavy gun mounting designs, owing to the fact that it has been the practice to fit horizontal elevating cylinders. In this new design there is practically a continuous girder, not only in the direction of the gun-mountings, but also at right angles to it, thoroughly binding together the fore and aft members of the structure.

The training gear of these mountings is also novel, from the fact that the engines, instead of giving a wavy line of considerable amplitude for their torque line, give practically a straight line; this is partly brought about by fitting an odd number of cylinders to the engines. Two sets of this gear are fitted, each of which is of sufficient power to operate the turret at the worst expected angle.

The ammunition supply is such that practically every motion of both shell and cordite are independent of one another, and, except in one case, the shell and cordite are carried in separate, independent hoists. Further, in order to compensate for delay in any particular hoist, arrangements are made so as to have charges and projectiles in what is known as "waiting positions," so that there can be travelling at the same time as many as six projectiles, which may be found in various positions more or less advanced towards the breech. This adds very materially to the speed of loading. In order to preserve the speed throughout a special high-speed direct rammer has been designed, capable of quick reversal, by means of which the whole operation of charging the gun can be performed in not more than eight seconds.

The steam pumping engine plant for generating the hydraulic pressure for working the mountings is being manufactured by the company, and considerable improvements have also been effected in this machinery.

Projectiles.

For a considerable time past in all countries having great maritime interests the most marked progress in the genesis of projectiles relates to the increased perforation and range obtained by the use of caps of special design.

The designs, as regards the external form of the cap, are of such a nature as to give greatly improved range and accuracy in flight. Special attention has also been paid to the interior form of the cap,

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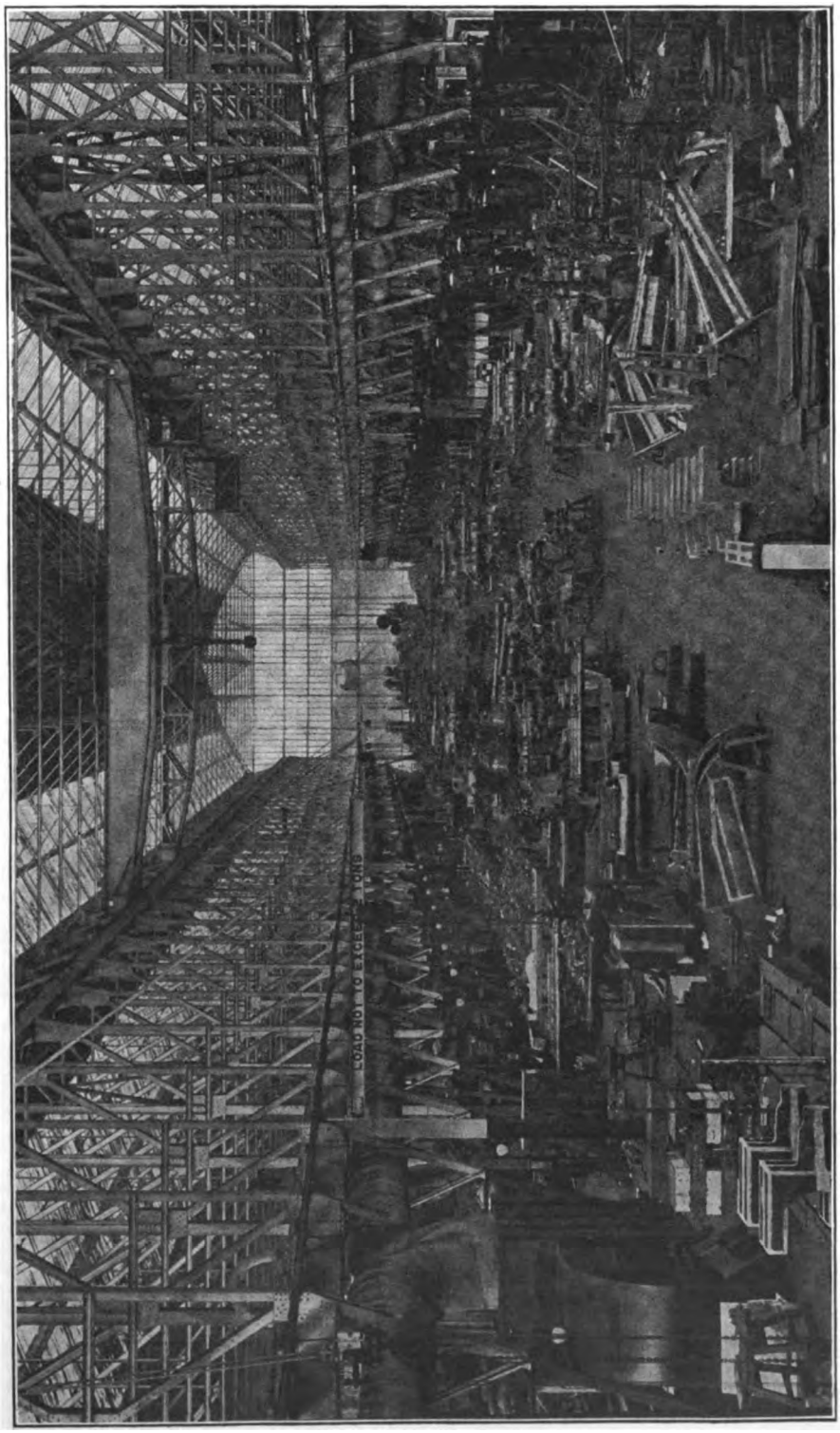

COVENTRY ORDNANCE WORKS.—PART OF MAIN BAY: NAVAL SHOP.

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as it has been found that this greatly influences the perforative value of the projectile under all conditions of the attack of armour.

For the past three or four years Messrs. Thos. Firth & Sons, Ltd., and Messrs. Hadfield's Steel Foundry Co., Ltd., have been studying

SECTION OF 12-IN. A.P. SHELL SHOWING HOLLOW CAP.
Thos. Firth & Sons, Ltd.

this subject concurrently, but independently, and have produced various forms of caps, for which patents have, we understand, been obtained.

The salient feature of these caps consists in making the forward

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portion hollow, thus reducing the amount of actual cap metal in front of the point of the projectile to a degree which general opinion and practice has hitherto held to be inadvisable, or, indeed, inadmissible.

If the best exterior form of cap for obtaining maximum range is adopted, and at the same time the solidity of the cap retained, the relative perforative efficiency of the projectile is actually reduced below that obtained with the blunt-ended type of cap formerly in use. The illustration on page 308 shows a shell with hollow type of cap exhibited by Messrs. Thos. Firth & Sons, Ltd., at the Argentine Exhibition. The small amount of metal in front of the point of the projectile can readily be seen in the photograph as reproduced.

This type of cap is the only one which satisfactorily permits of a modification in its shape to give heads of projectiles, when capped, the best form for flight through the atmosphere. The steadily increasing muzzle velocities of modern guns, which increase the resistance of the atmosphere to the movement of the projectile, make the form of the head of the projectile of greater importance than ever before.

Ammunition hoists.

The supply of ammunition to the secondary guns has been much improved. This has been a special study of the Armstrong, Whitworth Company, and the hoisting arrangement this firm now manufactures ensures the rapid supply of projectiles and charges to the guns with the minimum amount of labour. It is sometimes argued that with the comparatively few men now required for working the turrets and guns themselves, there is a surplus of men available for supplying the smaller guns with ammunition, which discounts the necessity of supplying mechanical means for this purpose. This is naturally the case when the ship's complement is intact, but the advantage of the mechanical supply over the manual supply would, under the stress of active war service, make itself felt, and justify the extra first cost involved in its supply.

The following is a description of the improved bucket and trays for ammunition hoist for secondary armament manufactured by Messrs. Armstrong, Whitworth & Company :—

This hoist, as illustrated on page 310, consists of semicircular buckets attached to arms connected to steel roller chains by pivoted attachments revolving round the sprocket wheels and allowing the bucket to remain pendent. The bucket has slots alternately at either side extending beyond the centre. The arms have projecting pins. A receiving tray at the bottom of the hoist is arranged in sections projecting beyond the centre of the bucket and fixed alternately to the diaphragm of the trunk of the hoist; these correspond to the slots in the bucket. A fixed discharging tray is arranged at the top of the hoist. In operating the hoist the ammunition is placed on the receiving tray at the bottom. The chain is revolved by means of suitable gearing, worked by an electric or other motor, and the buckets as they approach the receiving tray from the underside, and in passing through the section, carry away the ammunition to the top of the hoist, where the pins engage in the cams projecting from the arms, tilting the bucket as it descends and discharging the ammunition on

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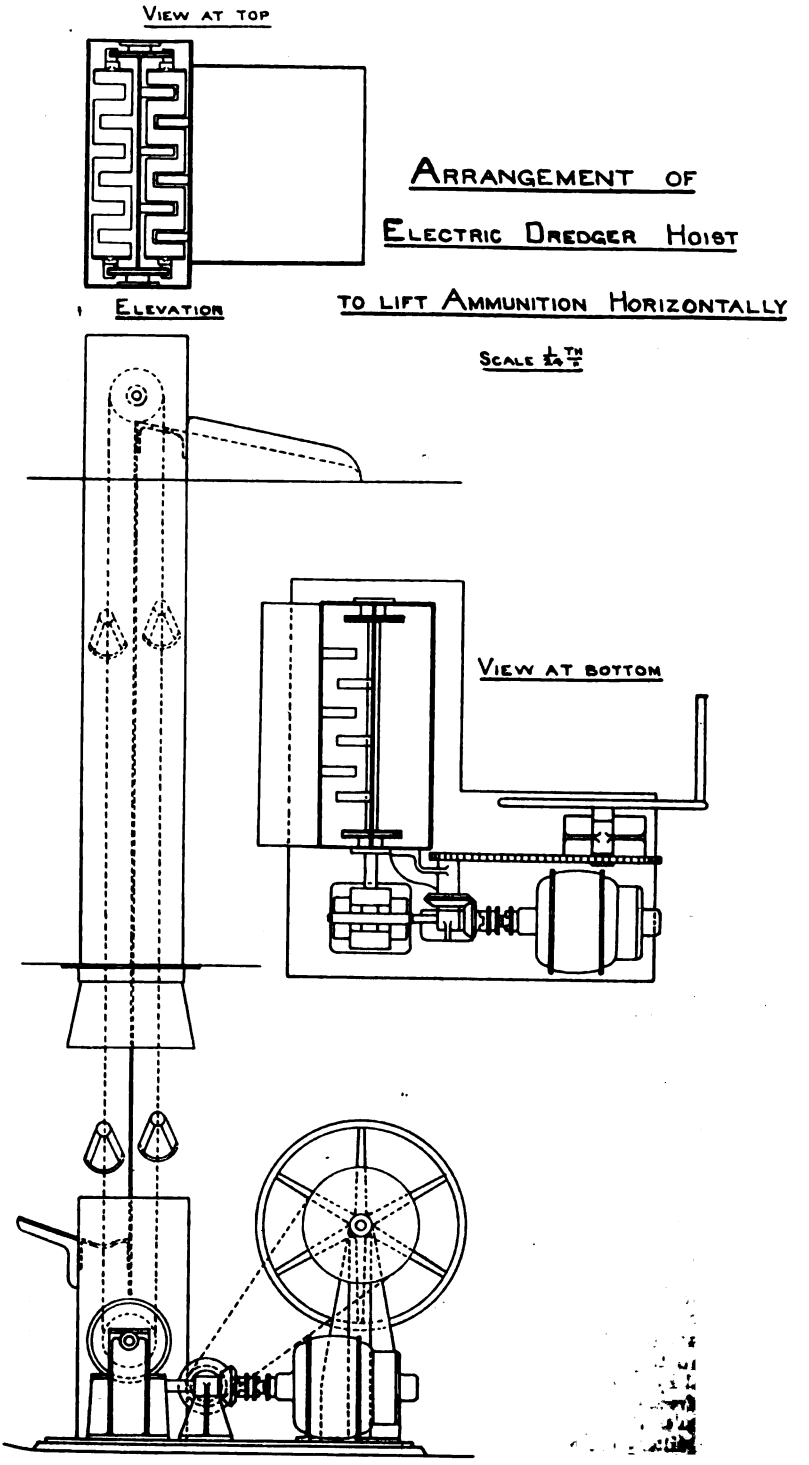

IMPROVED AMMUNITION HOIST.
Sir W. G. Armstrong, Whitworth & Co., Ltd.

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to the fixed tray. The bucket then reassumes the pendent position and descends to the bottom of the hoist. By this means a continuous running hoist is arranged for which will raise and deposit any description of ammunition without shock or damage.

Range-finding and fire control.

No account of the progress in naval ordnance can be considered complete without reference to questions of range-finding and fire control. The development in long-range firing has been partly due to improvements in range-finding, and it results in making range-finding instruments more and more necessary upon all ships carrying guns of large calibre.

Range-finders of various types have been experimented with for many years, but have now resolved themselves into practically one type of instrument, viz., that which was originally known as the short-base, single-observer range-finder, which may be defined as an instrument in which the range-taking is done by one man, in contra-distinction to a range-finder employing two men at some distance apart, each being provided with a telescopic appliance of some kind to be directed simultaneously upon the target, associated with electrical means for combining the two observed directions of the target, so as to give the range.

The best-known instrument of the latter kind was that of Captain Fiske, of the United States Navy, but the loss of accuracy due to the flexibility of the ship's structure, the necessity of collaboration between the two observers, and the extreme difficulty of recording at a distance with sufficient accuracy and rapidity the azimuthal positions of the telescopes, introduced errors which more than counterbalanced the increased accuracy that might have been expected from the use of a longer base. Further, at sea, the change of bearing of the target, relative to the ship, constantly alters the effective base when that consists of the distance between two fixed points on the ship, and although ingenious designs have been made to overcome the difficulties in this mode of working, such range-finders have never proved very successful in practice.

Of the single-observer, short-base range-finders the best-known and the earliest instrument to attain success is that of Messrs. Barr & Stroud, Glasgow, which works upon what is known as the "Coincidence System," by which two partial images of the target are brought together from the end of the base into one eyepiece, and are then adjusted into alignment by movements of a prism to which the range scale is connected directly or through suitable gearing.

Another example of the short-base instrument was the stereoscopic range-finder invented by de Grousilliers and constructed by the well-known firm of Zeiss, of Jena, but the stereoscopic range-finder, while very beautiful in conception and construction, has never

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been a favourite with naval officers, although several examples have been tried on board ships.

"Coincidence" range-finders, which are more or less on the same principle as the Barr & Stroud instrument, are now made by several firms on the Continent and in America, and are supplied by these firms to some foreign warships; but, with the exception of that of Germany, nearly all important navies are fitted with range-finders made by Messrs. Barr & Stroud.

These range-finders were at first constructed with a base of 4 ft. 6 in., but, to meet the increased accuracy demanded, instruments of 9 ft. base were introduced, and now instruments of 15 ft. and even longer bases are being constructed. The accuracy obtainable with them under good conditions is very remarkable when it is considered that the whole angle subtended by a base of 9 ft. between "infinity" and 1000 yards only amounts to one-sixth part of a degree.

The Barr & Stroud range-finder of 9 ft. base, operated by a skilled observer, is capable of working, under good conditions, at a range of 8000 yards to within 50 yards, and the range-finder of 15 ft. base is proportionately more accurate. To show the remarkable accuracy of the instruments it need only be stated that, even at long ranges, it is no uncommon occurrence for the first shot to hit the Service target.

To accommodate these instruments, which are large and heavy, special platforms have been erected on the masts of British ships, and in some foreign ships range-finders are mounted in armoured towers, situated in positions from which a good all-round view can be obtained.

Range-finders using the distance from the masthead to the water-line of the enemy, or other vertical length, have been tried, and are possibly in use in some navies. These have the merits of being comparatively small and simple instruments, but the uncertainty of the length between any two points on an enemy's ship is always a drawback in obtaining the necessary accuracy of observation.

The use of a range-finder, no matter how accurate it may be, does not give the artillerist all the information that he requires for the setting of his guns, and it is necessary to modify the ranges obtained from the range-finder by corrections obtained by observations of the relative speed and course of the enemy, etc., so that the range at a subsequent time may be estimated. Electro-mechanical devices for this purpose were first installed in the British Navy about the year 1894, and since then great developments have taken place in these, which are generally known as "fire-control" instruments. Such instruments consist of two kinds, firstly, those which are used for the determination of the rate of change of range, and the rate of change

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of bearing of the enemy, and, secondly, instruments which are used for transmitting the information obtained by the former instruments and by the range-finder to the guns.

The instruments for obtaining the corrections by observation of the movements of the enemy are all more or less dependent upon estimations of the enemy's course and speed, such observations being aided by the use of the range-finder. The instrument invented by Captain J. S. Dumaresq contains all the essentials of the problem, although several improvements have been made in this instrument since it was first introduced. The Dumaresq instrument is supplemented by what is known as a Vickers range-clock, which brings into the observations obtained by the instrument the element of time, and thus enables a forecast to be made of the probable range and deflection for a short time ahead.

The indications given by the range-finder and the Dumaresq instrument, corrected in some cases by observation of the fall of shot, are communicated to a transmitting station below armour, where the necessary corrections are applied, and the final result is telegraphed to the guns.

Special electrical installations are fitted in most warships for the purpose of supplying the fire control instruments with current of a suitable voltage, and the instruments themselves are a development of long experience in connection with electrical instruments for warship use.

In the French Navy pneumatic or hydraulic instruments working on the Bourdon pressure gauge principle have been utilised for the purpose of fire control, but it is more usual to employ instruments embodying simple electric motor devices, and the necessary indicating mechanisms. Automatic transmission of the range to the guns has been tried, and no doubt the adoption of such will become general when thoroughly satisfactory apparatus has been devised.

It is possible that in the near future this problem will be solved, and the gun-layer will have no duty to perform except to keep his weapon on the target and to fire it, the whole of the sighting, both range and deflection, being transmitted automatically to his gun-sights.

An illustration of a standard Barr & Stroud range-finder is given on next page. The following is a description of the instrument:—

The Barr and Stroud range-finders are extensively used for gunnery and navigational purposes in practically all the navies of the world. The instruments, which are of the single observer coincidence type, are manufactured in a large variety of forms and sizes, with either both images erect, or one erect and one inverted, to suit the requirements of the various Services. For naval, gunnery and fortress use, the standard range-finders have base lengths of 15 ft., 12 ft., 9 ft., and 4 ft. 6 in., and optical magnifications of 20 to 30 diameters. For navigational and field

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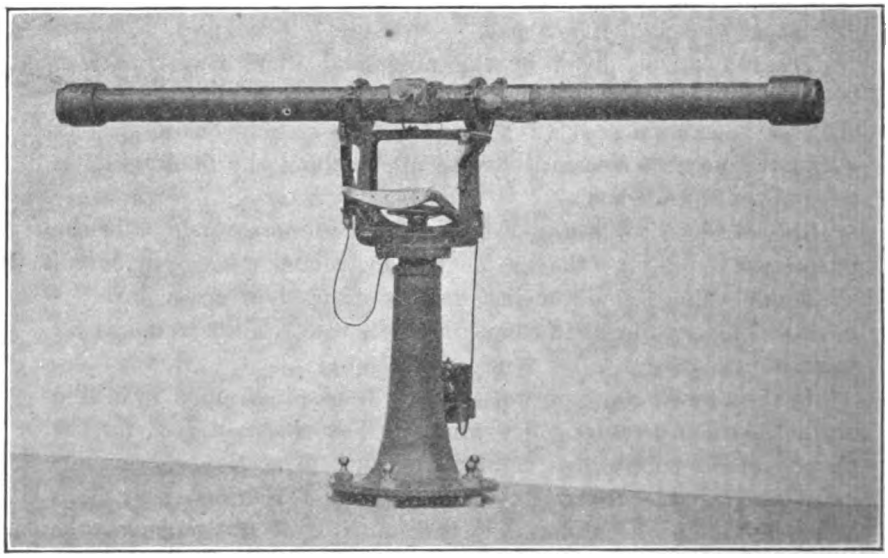
purposes there are supplied light portable instruments having base lengths of 66 cms., 80 cms. and 1 metre, and magnifications of from 12 to 20 diameters. Under favourable conditions the uncertainty of observation with the F.Q. type 9ft. base instrument, which is here illustrated, is 20 yards at 5000 yards, and with the 15 ft. base instrument 13 yards at 5000 yards.

Boom defence.

The Vickers Company have recently manufactured and conducted most successful experiments with a unique type of harbour defence appliance. This consists of a boom constructed in sections of suitable length, any number of sections of which may be connected to form any total length suitable to the requirements of the position and the extent of the harbour mouth to be protected. The boom is in two tiers—a lower and an upper portion—the upper portion



BARR & STROUD RANGE-FINDER.
F.Q. type, 9 ft. Base on Naval Mounting, N.M. type.

containing the firing apparatus, and each lower portion containing two or more very large charges of high explosive material.

The securing arrangements are such as to retain the booms in the required position, no matter how strong the current, and are so arranged that immediately the boom is engaged by an approaching vessel, a section, comprising three upper and three lower portions, is automatically disconnected and exploded beneath the hull in the most vulnerable part of the ship, and at the same time the connection to the anchoring arrangement is also automatically released, leaving the other parts of the boom not engaged still intact, and in an operative and defensive position to arrest the progress of and destroy any

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other vessels which may come in contact with them. These booms are of small diameter, and may be stowed on deck, either on drums like a submarine cable, or coiled on deck after the manner of a large rope cable. It is so arranged that the high explosive charges are very quickly inserted just before the apparatus is launched. Special safety devices make it quite safe to haul the "live" booms inboard when they are no longer required afloat (*see* illustrations on pages 316 and 317).

Aerial warfare.

The airship for the British Navy, to which reference was made in last year's *Naval Annual*, was put through some tests in its dock at Barrow in February, in the presence of the Government's Advisory Committee. From an article on the visit by the Committee, which appeared in the *Times*, the following particulars of the airship and its construction are taken:—

The airship is 512 ft. in length and 48 ft. in diameter. The outer covering of the upper half consists of silk treated with a special waterproof dressing, subsequently sprinkled with aluminium dust, which, while deflecting the sun's rays, gives a bright silvery appearance to the whole of the upper portion. The lower part is of yellow silk, treated with the same waterproofing material, but without the aluminium. Inside the framework about eighteen gas bags, filled with hydrogen, are placed. The two propelling motors, with their large propellers, were manufactured by the Wolseley Tool and Motor Car Company, Ltd., Birmingham, of which the Vickers Company are the proprietors, and each motor is placed in a gondola, of boat shape, suspended to the duralumin structure, and with a gangway of communication within the V-shaped central bottom girder of the structure. The rudders, air-planes, &c., are worked from the gondolas, where compasses and other navigating appliances are also arranged. The propellers have been designed as a result of many experiments made on the large "whirling table" specially constructed at the Vickers's works for testing airship and aeroplane propellers, and a high efficiency is expected. The engines were set to work and drove the propellers, and the rudders, &c., were operated. The members of the Committee seemed well pleased with the day's inspection and tests.

In the preparation of the first designs, and in the superintending of the first trial section at Vickers's works, Admiral Bacon, then Director of Naval Ordnance, represented the Admiralty, but he then retired from the Service to take up the managership of the Coventry Ordnance Works. Capt. Murray F. Sueter, R.N., a well-known torpedo officer, who had been responsible for the development of the first submarine boats, and is the author of a standard work on submarines, was sent to Barrow to take Admiral Bacon's place. The task before Capt. Sueter was no easy one. The contractors were having great difficulty in erecting the airship shed; it is supported partly on the dock wharf and partly on piles driven into the dock, and these latter sank into the sand forming the bed of the dock, owing to the weight of the superstructure as it was built. The piles were ultimately surrounded with concrete, and the settlement was thus stopped. Again the sections of the airship originally made for test purposes proved unsatisfactory, and had to be discarded. The large quantity of aluminium that had been purchased for the work could not be used, owing to its being untrustworthy in sections of great lengths. Many weeks' tests had to be undertaken before a suitable metal could be found, and it was not until Messrs. Vickers's chemist discovered duralumin that so huge a framework as that required for the airship could be proceeded with. Duralumin is one of the magnesium alloys of aluminium, with a specific gravity of 2·8, and is quite as strong as mild steel and yet of only one-third the weight. This metal was accepted by Capt. Sueter after tests by the naval experts. As up till this point no structure had been built of duralumin, the decision was a momentous one. The success achieved has justified the step taken.

Anti-balloon guns.

The Coventry Company, like other ordnance manufacturers, has got out a design for an anti-balloon gun on a position mounting, for use in permanent or semi-permanent defensive works. This weapon

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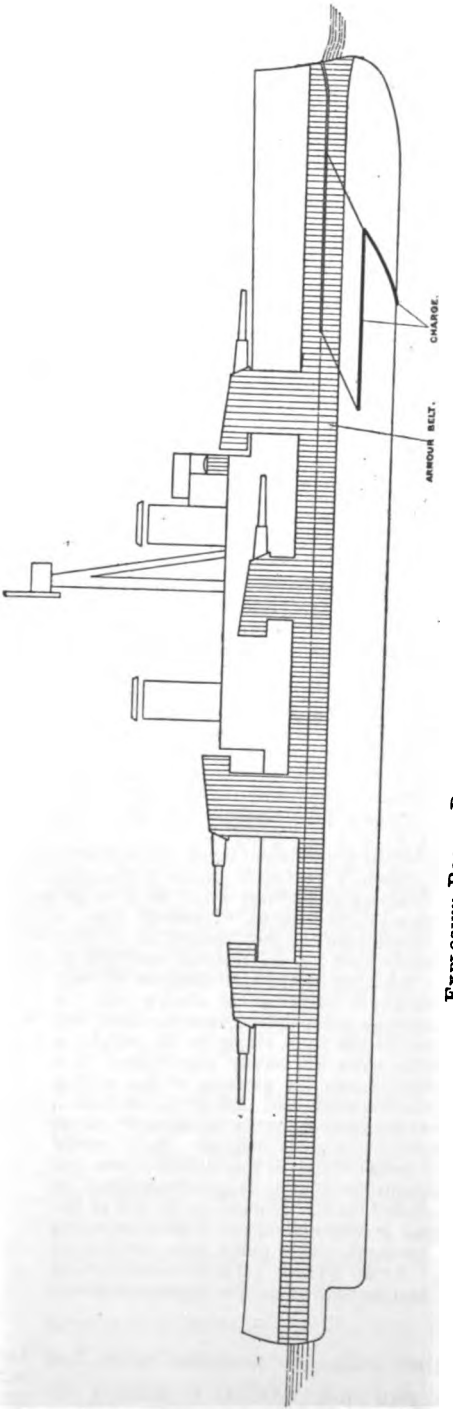
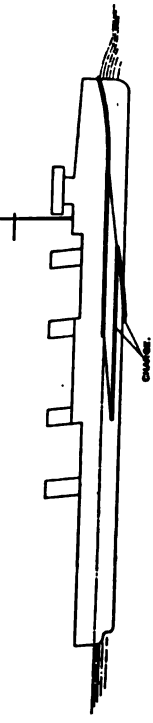


EXPLOSIVE BOOM: POSITION WHEN STRUCK BY BATTLESHIP.



EXPLOSIVE BOOM: STRUCK BY A DESTROYER.
Messrs. Vickers, Ltd.

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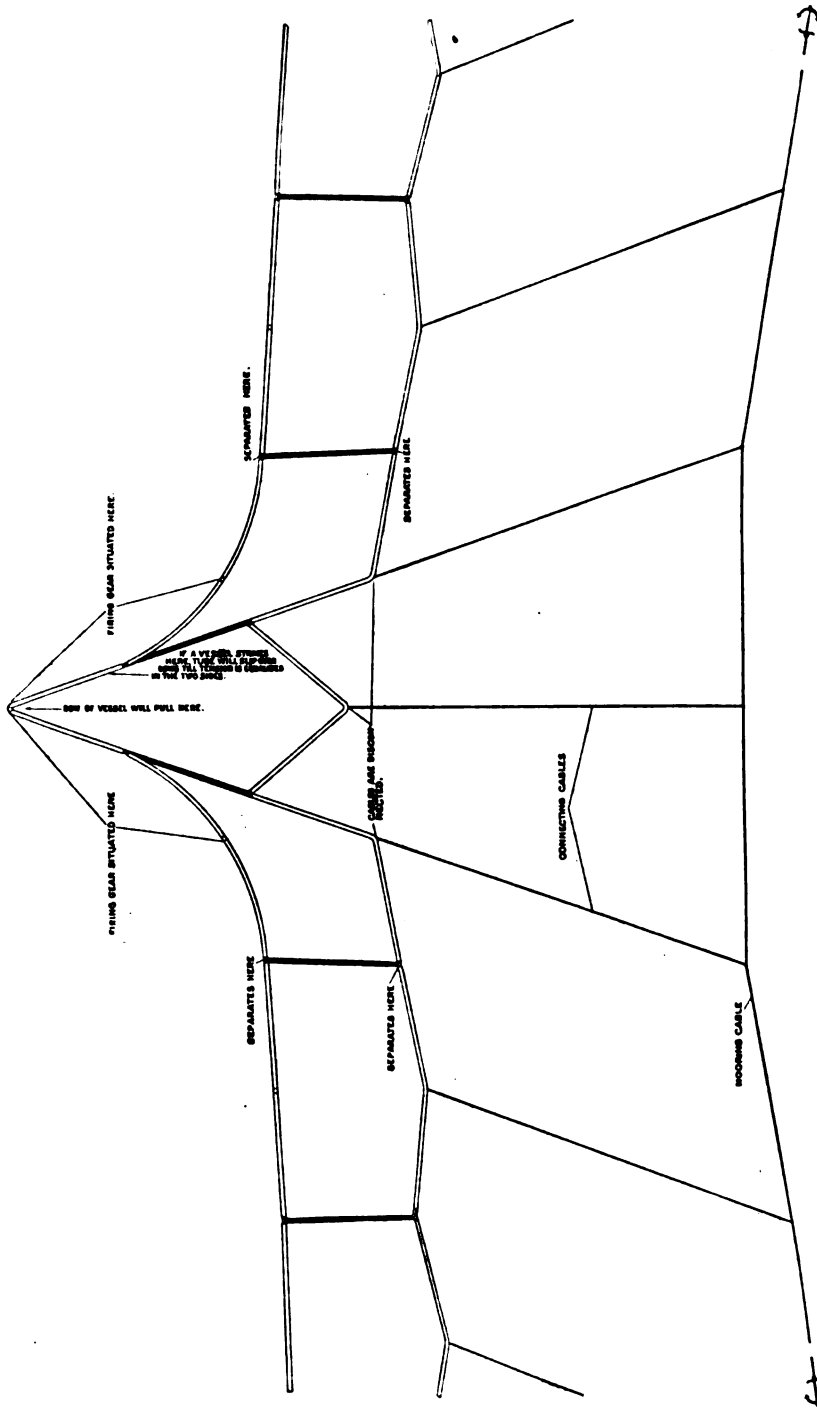

EXPLOSIVE BOOM: FORM TAKEN WHEN STRUCK.
Messrs. Vickers, Ltd.

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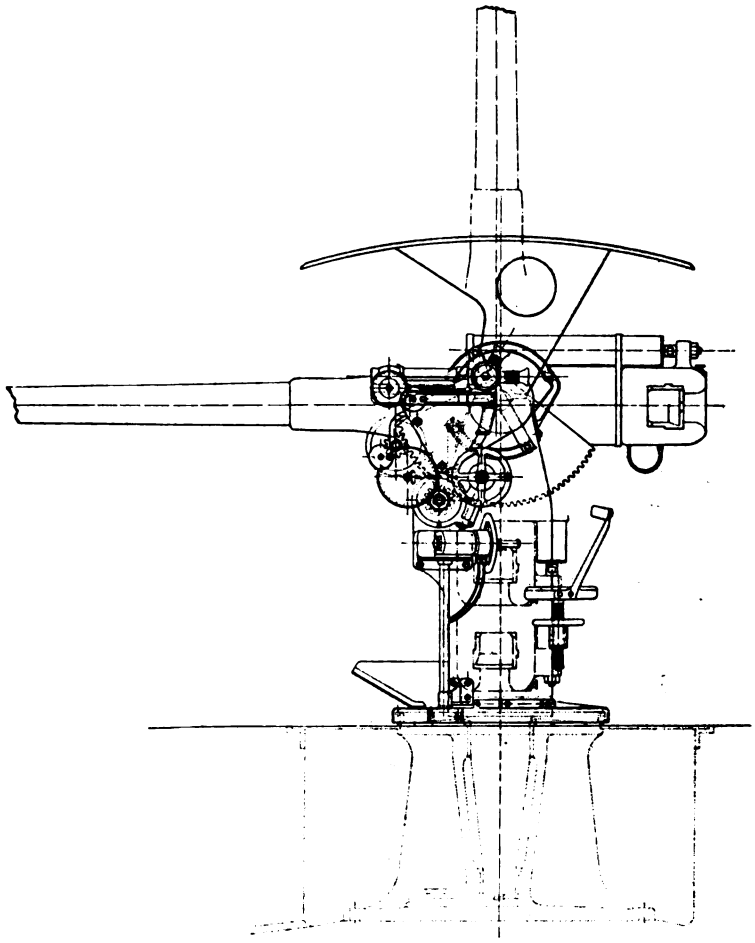
is a 12-pr. with a muzzle velocity of 2500 ft.-secs., and is capable of firing at any angle of elevation from 0° to 90°, with an arc of training of 360°. The projectile has a vertical range of 7000 yards. It is thus described:—

The gun and cradle are balanced at the trunnions, and the mounting is balanced on its pivot at all angles of elevation of the gun, thereby making training easy. The



12-PR. ANTI-BALLOON GUN ON POSITION MOUNTING.
Coventry Ordnance Works.

sighting arrangements are different from those hitherto adopted, the layer occupying a position somewhat similar to that employed in ordinary modern field guns. A specially designed telescope with two eye pieces is provided, which gives a comfortable attitude to the gunlayer at all angles of elevation. The sighting gear is a simple one which automatically corrects the tangent angle of elevation as the elevation of the target varies, the range and deflection for speed of target, wind and such like being put on by a separate sight setter.

The gun is provided with a horizontal wedge block mechanism adapted for fixed ammunition. It can be loaded at all angles of elevation up to 65°, but for higher

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angles of firing the gun and cradle are brought back to this position by a special quick elevating gear, situated on the right hand side of mounting. The sighting arrangements are not upset by this movement, but can remain directed on the target, being adjusted in the interval if necessary.

New plant.

While there is not a great deal to report in connection with the extension of works or the installation of new plant for the manufacture of war material, it is to be noted that in almost every branch of the industry there is plenty of work. Manufacturers are not keen to undertake fresh expenditure on plant, but they are forced to move with the times. New armour processes or improvements in guns, projectiles, and other appliances require additional machinery and tools for the production, rolling, cutting of forgings, etc.; moreover, the plant must be specially designed for its purposes. Should it prove to be true that a new system of armour-plate production is to be adopted, it will probably involve a large outlay on the part of the private firms engaged in this description of work.

At Elswick and Barrow extensions are being carried out, but these are more closely connected with ship-fitting facilities, like the similar extension of the Thames Iron Works, Ltd., at Dagenham, in Essex. On the other hand, it has been reported that the Steel Company of Scotland, Ltd., is about to enter the field of supply as heavy armour-plate manufacturers, and if this should be so, it will add to our resources in this direction. Although there have been no developments comparable with those mentioned in last year's *Naval Annual* at Parkhead and Tinsley, or the establishment of the Coventry Works, there are always a number of changes and replacements going on, and the great private arsenals and shipyards were never in a state of better preparation, either to execute orders for foreign Powers or to undertake any further work for the British Government.

Beardmore's.

Messrs. Wm. Beardmore & Co. have during the past year received orders for guns of 13·5-in., 9·2-in., and 6-in. calibre for the British Government, and have also had the work of re-lining worn 12-in. and 9·2-in. guns entrusted to them, so that the gun factory has been fairly well occupied, but not to anything like its full capacity.

A complete new range of steel melting furnaces and foundry for ingots has been completed, the capacity of which is equal to any in the United Kingdom, and of which the details comprise all the latest improvements towards the production of heavy ingots, whether for guns, armour, or other purposes.

In the matter of design of ordnance, the firm has given great attention to the question of employing cordite in tubular form rather than in cord form in heavy guns, and has produced designs of guns

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from 15-in. calibre downwards, embodying the use of this tubular cordite. The advantages claimed for these designs are a greatly increased duration of efficiency in the gun and greater accuracy. Practical trial has demonstrated these advantages, the latter, the accuracy, being attributable, in a large measure, to the peculiar proportions of the tubes adopted by the firm.

For the production of armour the firm have found it necessary during the past year to increase their powers of output, and have added a new shop with a 10,000-ton hydraulic press, new furnaces and plant for treatment of armour plates of the largest size, and a new armour rolling mill. The development of an improved plate has been engaging the attention of the firm, and very promising results have already been obtained. It is hoped that, with further experiments, a plate will be produced which will quite outclass the Krupp cemented armour.

The firm have entered the field of manufacture of gun-mountings, but so far have limited themselves to "hand worked," *e.g.*, for 4-in. and 6-in. guns. These comprise a novel form of sighting, but in other respects are of the usual naval pattern; this work is carried on at their Dalmuir Shipbuilding Works.

Coventry Works.

The Coventry Ordnance Works during the last twelve months have been busily employed in the manufacture of ordnance, ranging from the largest calibre of modern guns down to twelve-pounders, and in naval mountings from the largest size of barbettes to small transferable mountings. During the present year five barbette mountings will be delivered, and other sets are in course of manufacture. A large number of 6-in., 4-in. of various types, and 12-pr. guns and mountings of new design are under construction.

A Coventry type of 6-in. mounting (Mark VI.) on the same lines as that illustrated in last year's *Naval Annual* has been adopted by the Admiralty, and a large number are being made at Coventry. This mounting has several unique features, and is an advance on earlier types. Before being adopted, the mounting was subjected to exhaustive trials at sea. These mountings are provided with cast-steel shields made by Messrs. Cammell Laird & Co.

A new design of mounting for destroyers has been designed by the Coventry firm, and has been adopted by the Admiralty. This mounting (the 4-in. Mark V.) takes a low-velocity 4-in. gun, and has several novel features. It is an improvement on that mentioned in the *Naval Annual* for last year.

The following is a description of the pedestal mounting for

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3-in. (76·2 mm.) 50 cal. guns made by the Coventry Ordnance Company, and illustrated on the next page:—

PARTICULARS OF MOUNTING, &c.

Weight of Gun and Mechanism	18·5 cwts. ...	940 kilos.
Weight of Mounting	16·5 ,, ...	838 kilos.
Total Weight	35·0 ,, ...	1778 kilos.
Height of Fire	43·5 inches ...	1105 mm.
Length of Recoil	28·0 ,, ...	711 mm.
Max. Force of Recoil	5·0 tons ...	5080 kilos.
Max. Upward Lift	6·5 ,, ...	6600 kilos.
Max. Downward Blow	8·3 ,, ...	8440 kilos.
Max. Elevation	20 degrees.	
Max. Depression	10 ,,	

The mounting consists of the following principal parts:—Cradle, with hydraulic cylinder, running-out spring case, elevating and sighting gears, and other parts and fittings complete. Carriage, including pivot, bearings for cradle trunnions, elevating arc, training gear, and other parts and fittings complete. Pedestal, complete.

The cradle is a high strength brass casting, comprising the circular portion through which the gun recoils, collars into which is screwed the spring case, trunnions, and facings for the sight bracket and other fittings. The hydraulic cylinder is of forged steel, made in two parts, screwed and riveted together. It is carried inside the spring case which is screwed into collars on the under side of the cradle, and is secured to the lug on the breech ring of the gun. The front end is closed by means of a high strength brass plug, containing the leather and cotton packing, forming the gland through which the piston-rod passes. The piston-rod is a steel forging secured to a crosshead attached to the front of the spring case. It carries at its rear end the valve and piston controlling recoil and run-out. The valve is of the rotary type, being actuated by inclined grooves cut in the recoil cylinder, and ports are cut in the piston and valve, through which the buffer liquid passes, on recoil and run-out, and these ports are so arranged as to give an approximately uniform pressure in the recoil cylinder on recoil, and to control the running-out of the gun so that it is brought gently into the firing position. The running-out spring is in four parts, is carried inside the spring case, and supported on the recoil cylinder. It is sufficiently compressed to ensure the gun being returned to, and retained in, the firing position after recoil, and it is so arranged as to be easily and safely inserted in, or removed from, the cradle under initial compression.

The sights are of the cross connected telescope pattern having dials graduated for range and deflection, provision being made for variations in muzzle velocity. Movement is given to the sights by means of a cam, and they are cross connected by a strong forged steel frame, which also forms the pivot, and is carried in a bracket attached to the cradle. An open sight is carried on the left telescope holder, and the trainer's telescope is arranged so that it may be moved with, or independently of, the gun-layer's. The telescopes are of the variable power day and night pattern.

The carriage and pivot consist of one steel forging in which are formed the bearings for the cradle trunnions. The pivot is carried in bearings in the pedestal, and is provided at its base with a steel block resting on a similar one in the pedestal, on which the weight of the gun and carriage is taken. To the right side is attached a steel bar carrying the elevating arc, and a bracket carrying the training worm. An oil bath for the training worm and wheel is carried on the lower end of the rectangular portion of the carriage. The elevating gear comprises an arc on the right side in which gears a pinion whose spindle is carried in bearings on the under side of the cradle, and is rotated by means of a worm and wheel carried in a bracket attached to the left side of the cradle. The worm is rotated by means of a hand-wheel and bevel gearing, and the worm wheel is connected to a pinion spindle by means of a friction clutch consisting of steel and brass washers pressed together by a spring washer. When the gun is being elevated the hand-wheel rotates in the same direction as the gun. The training gear comprises a steel worm wheel securely attached to the top of the pedestal, a phosphor bronze worm carried in a gun-metal bracket on the carriage, provided with adjustable thrust bearings for the worm, and a worm spindle carrying at its end a hand-wheel. The hand-wheel is of large diameter, and the worm spindle is carried in bearings which are pivoted so as to allow the worm to be adjusted, so that all backlash is eliminated. The worm and wheel are partially submerged in an oil bath carried on the carriage. A guard plate attached to the side bar covers up the elevating arc and pinion, and provides a rest

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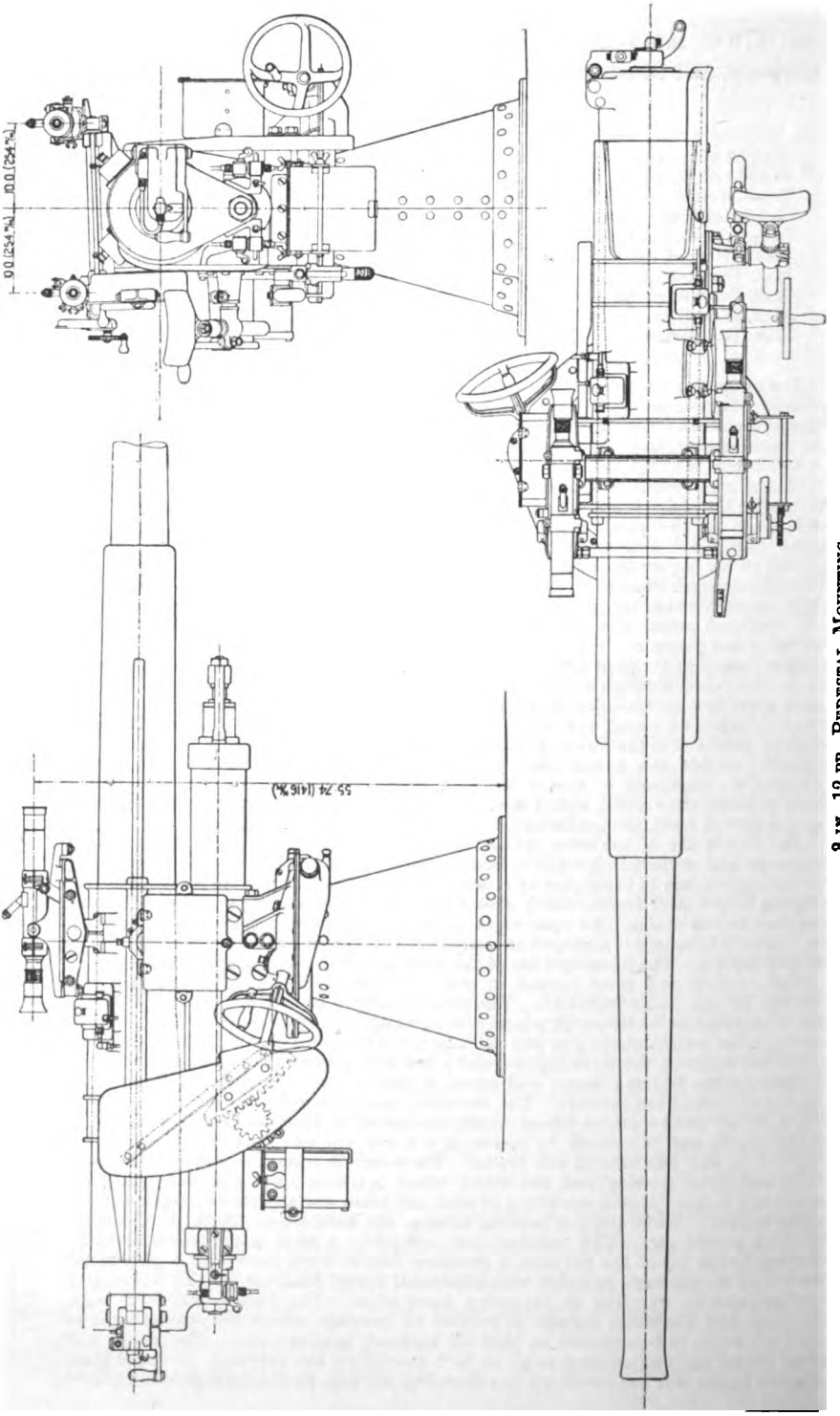

3-IN. 12-PR. PEDESTAL MOUNTING.
Coventry Ordnance Works.

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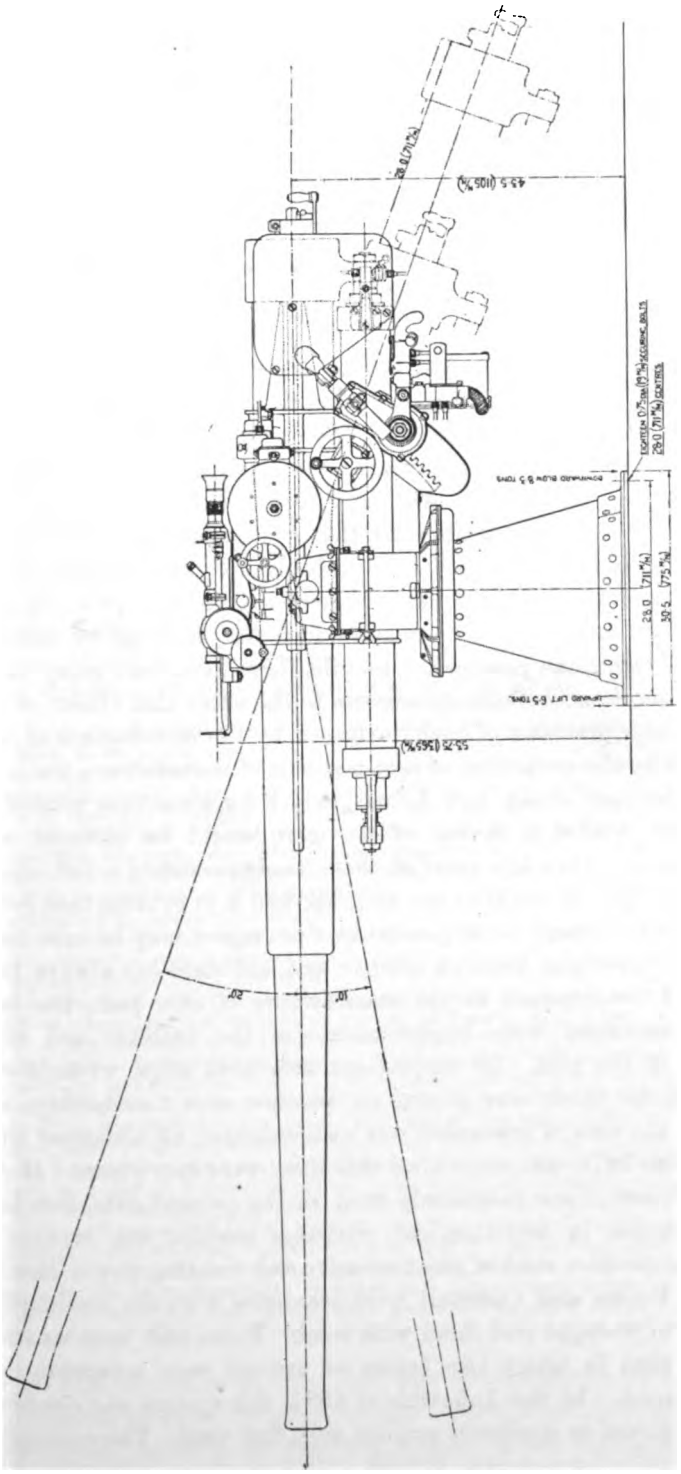

3-IN. 12-PR. PEDESTAL MOUNTING.
Coventry Ordnance Works.

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against which the trainer can lean. The top of the hand-wheel rim moves in the same direction as the gun when being trained.

The pedestal is built up of steel plate in the form of a cone, to which are securely attached forged steel upper and lower sockets. The lower socket is lined with brass, and fitted with a hard steel block, forming the footstep bearing for the pivot. The gun is arranged to be fired electrically from firing handles on the left side of the mounting, the current being taken from battery boxes carried on the mounting. Two complete circuits are provided, so that in the event of one failing the other can be immediately substituted. Duplicate rubbing safety contacts are provided, one on each side of the mounting, and are so arranged as to prevent the gun being fired unless it is within one inch of the firing position. Mechanical firing by lanyard is provided for by a percussion lock on the breech mechanism. The telescopes and sight dials are illuminated for night sight use, the current being taken from the battery boxes on the mounting, and switches are provided for the telescopes and the dial lamps.

Armour.

In the *Naval Annual* last year it was stated that there had been virtually no advance in regard to the manufacture of armour-plate for the protection of ships of war. So far as was then known, the armour of all ships building was of the quality known as Krupp's armour, or similar material with modifications of manufacture. At the same time it was anticipated that the impending expiration of the Harvey-Krupp patents would probably give encouragement and stimulus to inventors and others interested in the production of armour over and above the constant incentive to improve resisting power. During the past twelve months there have been many vague reports and some definite statements to the effect that either as the result of new processes of heat treatment, by the introduction of new alloys, or by the perfection of new methods of manufacture, the competition between attack and defence, which for some time seemed to have been settled in favour of the gun, would be renewed with fresh vigour. Although some of these announcements are obviously premature, this is not the case with all, and it is evident that before long some important developments in this respect may be expected.

The competition between armour and ordnance has always been keen, and development in the manufacture of new plate has been closely associated with improvements in the ballistic and other qualities of the gun. In the earliest armoured ships, wrought-iron about 4½ in. thick was placed in patches over the battery, and although the area of protection was soon enlarged, all armoured ships built before 1876, and some after that date, were iron-plated. Hence the name, sometimes mistakenly used at the present date, ironclads. Improvements in metallurgical processes enabled the makers of armour to produce steel of great tenacity and resisting power, and the firms of Brown and Cammell were associated with the manufacture of plates of wrought iron faced with steel. There had been an intermediate plan in which two layers of armour were separated by a layer of wood. In the Inflexible of 1881, this system was combined with compound or composite armour, now first used. The outer plate

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of the armour of the Inflexible had a wrought iron back with a steel face, the whole being welded and rolled together. To deal with the improved resistance of the plates, forged steel was introduced as the material of which projectiles were made instead of chilled cast iron, and at this period both shot and shell penetrated the target. It was to resist the forged steel projectiles that compound steel plates were made. The difficulty had been to give a solid plate of steel the desired hardness in front and toughness at back. By uniting a hard steel face and a soft steel foundation, this difficulty was, more or less, overcome. The results were not entirely satisfactory, but in most countries compound armour was preferred to solid steel. Then the Schneider Company, of Creusot, which had led the way with all steel plates, added five per cent. of nickel with marked success. These nickel plates resisted best, but broke up badly, just as the all-steel plates had behaved, while compound plates, on the other hand, were completely perforated, as a rule, and the face plate was liable to split off. At this time, 3000 yards was thought to be the maximum range at which side armour would be attacked.

Compound plates.

In the *Naval Annual* for 1891, the late Captain Orde-Browne compared the position of British armour with foreign. He said:—

> No ship has nickel steel plates up to the present time. As regards the ships afloat, the defeat of compound armour need not trouble us, seeing that the steel, which has beaten it, is the result of all the latest improvements, and steel plates on the sides of existing ships cannot be so good. Next, that the test applies to the case of direct fire, and that any obliquity in the direction of the fire, such as must obtain on service, is all in favour of the compound plate with its harder face, so, also, is any inferiority in the projectile. Then, again, compound makers urge that steel admits of increased excellence being given, by special efforts, to a champion plate, which could not be bestowed on those supplied on a large scale. Be this as it may, there is nothing worth serious consideration in the condition of our armour afloat.
>
> As concerns the armour of the future, it is quite otherwise. Vigorous action is most necessary to restore our prestige, to keep up our trade in armour, and even to obtain the best shields for the sides of our ships; for the faults that may be disregarded in vessels hitherto completed must become more serious as time goes on and rival armaments are brought to greater perfection. From what has been said above, it may, perhaps, be accepted by readers that our own authorities have forced English armour to take the character it now possesses—that is, having a hard face supported by soft tough material, very difficult to break up, but comparatively easily perforated. With inferior projectiles this may have been all very well, but with those of the present day it can hardly be doubted that our armour is liable to perforation under conditions when foreign armour is not liable to it; and perforation, not fracture, is the danger that threatens the ship. As already said, no vessel will remain long enough exposed to attack to have her armour destroyed by shattering even by quick-fire guns, but perforation means the entrance of dead metal, and langridge or fragments into her interior, even when attacked by guns only slightly outmatching the resisting power of armour, and it may in some cases involve the entrance of projectiles containing high explosives, which remain intact until they are inside the ship, when their explosion will indeed work havoc. Six or seven inches of armour has been already thus perforated by shells before bursting, and shells and fuses with deferred action must be expected to improve with time.

Harvey plates.

Almost at the same date that this was written, a series of trials were taking place in America, at the Indian Head proving grounds, which were to have far-reaching results in all countries. Nickel

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steel plates manufactured with the face carburised and hardened on a system invented by Mr. Harvey exhibited resisting powers greatly in excess of any hitherto tested. Forged steel shot which could perforate compound armour were broken up against the Harveyed hard face. Toughness was imparted to the plate by the use of nickel, and the depth of carborising action hardened the face from about three-quarters of an inch to one inch. The Maine, launched in 1890, and afterwards lost at Havana, was the first ship in the United States Navy to be protected with Harveyed armour, and the Renown, laid down in 1893, was the first ship in the British Navy to be plated with armour manufactured on the same system. There can be little doubt that the stimulus to improvements in armour was at least in part given by the introduction, about this time, of an armour-piercing shell, to carry a high explosive or other bursting charge through steel plates of a thickness equal to its own calibre, and with the fuse in the base. From this date, also, may be timed the disappearance of shot or solid projectiles altogether.

For a few years, plates made by the Harvey process were universally used, and then to this was added the Krupp process, and from about 1897 all ships were plated with the improved armour; and this, it may be said, is the protection to be found on all ships at the present day. It was stated, it is true, when the Lion was launched that her armour, made by an English firm, would have about 30 per cent. more resisting power than that of the earlier vessels of the Dreadnought era. The origin of this statement has not been traced, nor upon what foundation it is based. It is noteworthy, however, that in many reference books this ship and others are stated to be supplied with "Simpson armour," but it is made manifest, by an article which appeared in the *Times Engineering Supplement* on March 29, that this cannot be the case. The following description of this system of manufacture is therein given :—

Simpson plates.

It was some three years ago that Mr. W. S. Simpson, in the course of experiments, discovered by chance that copper and steel, when treated in a certain way, formed a molecular mixture or solid solution of the two metals. After some trials, he found that when two plates of steel, with a section or layer of copper between them, were placed in a mixture of carbon, brown sugar, and water, of the consistency of compressed snow, and the whole mass submitted to a temperature of 2000 degrees Fahrenheit, the copper melted away into the steel and formed a perfect weld. So complete was the union between the two plates that, however treated, they would not part or split at the juncture. Not only was this the case, but the copper, when it entered the steel, increased the tenacity of the latter metal. Samples of such welds were submitted to Professor J. O. Arnold, of the University of Sheffield, who examined them by alternating stress tests and micrographic analysis. Referring to one micrograph he said that it showed :—

"A portion of the thin weld line in which a considerable part of the copper seam has disappeared, owing to the metal dissolving in the steel, to form a solid solution micrographically almost indistinguishable from the steel itself. Had the welding been continued for some time longer, there would be no visible weld line left, but merely a solution of copper in the steel, molecularly continuous with the steel itself,

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and considerably stronger than the main body of metal, because the copper will have disappeared (visually) after having brought into perfect continuity the molecules of both faces of the steel. The fact that the copper joint is completely soluble in the steel means that to the eye there is no copper visible, it being in a molecular form beyond the range of microscopic vision as an inter-molecular absorption of the copper and steel considerably stronger than the steel itself. The weld, in the ordinary acceptance of the term, no longer exists, hence securing absolute molecular continuity; it is therefore obvious that welds made by this process are stronger than the steel itself."

APPLICATION TO ARMOUR PLATING.

It may readily be imagined that such a welding process may be put to many uses, but for the purposes of the present article its application to armour plates is especially interesting. As is well known, by the face-hardening processes which have been in use for some time past, carburization of the armour-plate does not extend to a greater depth than seven-eighths of an inch. A hard face and a tough back are obtained, but the hard face is neither as hard nor as thick as could be wished. If, then, it were possible to take high speed steel, say of double this thickness, and weld it to a soft steel backing, an immense advantage would be gained, and this is what can be done with the Simpson weld. Not only is the high speed steel many times harder than ordinary steels, but the hardened face of the plate can be made of any thickness desired. It is understood that trials have been made already with plates of the usual regulation size in which two inches of hard steel were welded to four inches of soft, and which, when attacked by a 6-in. gun, gave entirely satisfactory results. Larger plates are now being made and will soon be tried, and although the Simpson armour must be said to be still in an experimental stage, the results of the trials to be carried out with it will certainly be looked forward to with more than usual interest.

It is obvious that should the Simpson process be successful it may result not only in a return to composite or compound armour, but probably in a reduction of the weight and thickness of the plate used for the protection of ships of war. Not only can high speed steel be welded to soft steel as a facing, but it may also be used as a backing, and in any case plates made of alternate layers of hard and soft steel are not unlikely to be tested. Meanwhile in other quarters satisfactory results have been obtained, both in this country and abroad, by the introduction of new alloys and improved methods of manufacture. It is quite certain that both in Europe and America ships that are now being built will be plated with improved armour —armour with a considerably greater resisting power than that which was attained by earlier methods. From the 24 inches of armoured plating on the Inflexible in 1881, we came down in about ten years to plates with a greater resistance of half that thickness. It is now just another ten years since that happened, and it may be that a very similar development is now about to take place.

In regard to armour not perhaps primarily intended for the thickest plating, but which may in time be used for any purpose of protection, some interesting data were given in the *Naval Annual* of 1909 with regard to trials of corrugated Era armour and their encouraging results. Armour-plates of Era steel have been made in large sizes and have shown remarkable resistance to penetration. In last year's *Naval Annual* some remarkable results attained at the Indian Head

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proving ground with "special treatment" plates, supplied by the Carnegie Steel Company of America, were described. An important test was recently made by the Russian Admiralty at their Polygon, at Ochta, of this new vanadium steel deck armour-plate. The plate was two inches in thickness, and was attacked by a 6-in. gun firing an armour-piercing projectile weighing 87 lb. at an angle of 15 degrees to the normal. The result was astonishing, being merely a slight bulge in the plate—no cracks were developed.

Carnegie vanadium plates.

The vanadium plate stands by itself in a class apart from all armour-plates hitherto made, inasmuch as it is treated specially to resist the impact of projectiles striking at an angle. It is well known in the metallurgy of steel that when extreme hardness is produced in an armour-plate there must necessarily be a falling off in ductility or an increase in brittleness, because hardness and ductility are necessarily opposed characteristics in steel. In armour-plate of 8-in. thickness and upwards, these opposing characteristics are rendered more or less reconcilable by the system of differential heat treatment, such as is carried out in the manufacture of Krupp armour, whereby the back of such plates is made tough, whilst the front, intended to receive the impact of the projectile, is made abnormally hard. The thickness of such plates enables this to be done, because the passage of the heat from the front to the back in the heat treatment process is comparatively slow, but hitherto when the attempt has been made to produce similar hardness of front and toughness of back in thin armour-plate—that is to say, plates of one, two and three inches in thickness—it has been found impossible in practice to obtain satisfactory results, owing to the rapid conduction of heat from front to back during the treatment.. The Carnegie Steel Company, having taken up the problem, devoted special attention to the manufacture of thin plates for deck protection, turrets, etc., and in so doing proceeded on a new theory. It was recognised that in actual naval warfare practically all the hits would be made at an angle, especially at the long ranges now practised, when scarcely any of the hits on the armour would ever occur with direct impact. Acting upon this theory, the Carnegie Company have succeeded in producing a plate up to three inches in thickness, which, when subjected to oblique fire, gives most remarkable results. The surface of such plates is not so hard as the surface of the Krupp thick armour plate, but it is extraordinarily tough, and is found to withstand striking energies that easily shatter plates of similar thickness made on other systems.

The great efficiency of this plate would appear to be due to the presence of a considerable percentage of vanadium alloy, coupled

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with a new method of differential heat treatment, which produces a very fine grain in the steel, shading into a fibrous condition. So satisfactory have these new plates proved in ballistic trials against oblique fire that, as was said in last year's *Naval Annual*, the American Government has definitely adopted them for the thin armour of the new battleships. The attention of other nations is now being given to the importance of this new departure, and it is reported that satisfactory tests have been made recently by the authorities both in this country and in Germany.

Steel manufacture.

Something may be said in this chapter about the manufacture of heavy gun forgings, the different methods of testing steel, and the research departments and laboratories which are now an essential feature in any large modern steel works. In an article in the *Times Engineering Supplement*, of March 1, descriptive of new processes for the manufacture of steel which had been adopted on the Continent, it was stated that Messrs. Krupp have set up five 15-ton electric furnaces. The steel made by this process was said to be of high quality and to be exclusively used on the Continent for armour-piercing projectiles, as well as coming into use for gun forgings, but not for armour-plates. The process is an expensive one, its economy depending on the cost of the current supplied. These electric furnaces are not being used at present in this country for the manufacture of gun steel, which is always made by the Siemens-Martin open-hearth process; the larger ingots are usually cast from furnaces holding upwards of 40 tons of material. Apparently it is only at Krupp's works where comparatively large masses of steel are made in crucibles. Possibly where crucible steel is used for the manufacture of gun forgings the electric furnace may be an advantage, as the manufacture of the enormous ingots required for heavy gun forgings is difficult and expensive when made from crucible steel in which each crucible contains less than 200 lb. of steel. It is a matter for consideration, therefore, whether electric furnaces containing charges of about five tons each would not be less expensive and equally efficient for producing reliable steel, but as 20 of them would be required to produce one ingot the expense of the installation would be considerable. Again, the electric furnace is still in a more or less experimental position, and it seems probable that steel made in the electric furnace will have a special classification and use, and will at all events not take the place of the gun steel made in the Siemens-Martin furnace in this country for some time to come.

Research work.

Steel manufacturers have realised that the demands of engineers during recent years have called for steel, the result of scientific practice. The science of steel-making is a modern growth, though

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steel-making as an art is many centuries old. With a view to regular and systematic scientific investigation all large steel manufacturing firms have now special departments entirely devoted to research. These departments are staffed by men who must be familiar with both the science and the art of steel-making. To find suitable men is one of the most serious difficulties in establishing a research department.

The firms of John Brown & Co., Ltd., and Thos. Firth & Sons, Ltd., some years since established a special department for research. This department consists of a mechanical laboratory fitted with saws, lathes, milling and drilling machines for preparing every description of test piece, and the most modern form of tensile, impact and alternating machines for breaking tests and autographically recording the results. There is also an extensive installation of muffle and salt bath furnaces for experimental heat treatment, fitted with continuously recording devices and a number of ingenious arrangements for regulating the rate of heating and cooling, so that the slow heating and cooling of large masses can be reproduced in small specimens. There is also a pyrometric laboratory for scientific thermal analysis and for the calculation and synchronisation of the pyrometers of the various sorts used throughout the works.

A micro-photographic laboratory forms part of the establishment, where the modifications in the structure of steel produced by heat and mechanical treatment are investigated. This department contains special lanterns for throwing illustrations on a large scale on a screen. This apparatus is particularly useful for studying the variations in gun steel, armour-plate steel, railway tyre and axle steel, tool steels, etc. The building also contains a chemical laboratory where the magnetic and electrical properties of alloy steels are studied. A steel works library and museum completes the department.

The results obtained in the research laboratory are carefully compiled and tabulated for convenient reference, and are applied throughout the whole of the great works with which the laboratory is connected. The research laboratory is also, of course, constantly investigating the properties produced in steel by the addition of the numerous ferro-alloys which are being brought into commercial use, such as titanium, uranium, tantallum, and zirkonium. The effect of temperature on steels of every description, and more particularly on alloy steels, is so remarkable in its extent that the whole of the methods and systems in use for heating or cooling steel have to be most carefully watched and scientifically arranged. No engineer using alloy steel should apply heat without an exact knowledge of

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the results likely to accrue, or he may seriously injure the material he is using without having realised that the properties intended and worked for by the steel maker have been entirely lost.

The following are particulars of tests which are carried out in the physical and experimental laboratories of an armour-plate manufacturing company.

Special Physical Tests.

Curves of the thermal properties.—Giving the most suitable temperatures for hardening, annealing, &c., in order to produce any particular effect.

Microscopy.—For the determination of the thermal and mechanical treatments to which the steels have been subjected. Also the presence of cavities and slag, or other signs of weakness and general imperfection.

Electric and magnetic properties.—Determinations of pole strength and permanency in permanent magnets, permeability and hysteresis coefficients of soft steel for dynamo magnets, &c. Determination of point of disappearance of magnetism on heating. Most suitable temperature for treating ordinary steels. Electrical resistance and temperature coefficients of special alloy.

Thermal expansion and conductivity for accurately fitting parts of machines which are subjected to a certain degree of variation in temperatures.

Corrosion tests.—For determining the comparative durability of steels when in contact with liquids or moist earth.

Pyrometry, installation, calibration and maintenance of electric pyrometers both as recorders or simply reading instruments.

Giving the temperatures and other conditions required to obtain a certain mechanical result.

Mechanical Tests.

Tensile tests, including the visible yield, the true elastic limit or limit of proportionality, permanent and sub-permanent extension.

The modulus of elasticity applied to special steels.

Dynamic tests.—The Wöler rotating fatigue test; the Jude and Seaton alternating notched bar test; the Izod pendulum notched bar method for testing endurance under rapidly varying or alternating stresses.

Abrasion hardness test.—Giving a numerical value approximating the various working conditions of steels.

Indentation hardness tests.—The Brinell, the Scleroscope and other dynamic indentation methods, for determination of comparative resistance under ballistic or other similar conditions.

Foreign Powers.

Foreign naval opinion

To discover the tendencies of professional thought, and often the developments of practical progress, in foreign navies is difficult, even where it is possible. There is now a general recognition of the fact that the introduction of a ship depending for fire effect wholly, or almost wholly, upon an armament composed of a considerable number of guns of a single large calibre has permanently affected the course of naval construction. Further, it has come to be recognised that the so-called "Dreadnought" is an economical type, and that the nearer is the approach made to the adoption of its essential character, the more advantageous, from the double point of view of economy and fire value, will the results be. The merits of a system of single calibre are fully admitted in the 1910 volume of "Nauticus." A

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medium armament may interfere, it says, with observation of fire in a confusion of results, and may also impede accuracy of fire direction, owing to irregular refraction of rays of light which pass through hot air, caused by the secondary armament, affecting accuracy of aim. Moreover, at medium ranges the effect of the large calibre gun is incomparably greater than that of medium guns. Nevertheless, in Germany and Japan the co-existence of the two classes of guns is maintained, and elsewhere there are guns which might be described as intermediate between the minor and the medium gun.

Medium guns.

"Nauticus" says, indeed, that the question of the maintenance or abolition of the medium gun is confused by looseness of nomenclature. In the French Navy the 5·4-in. gun is included in the medium armament, and in the United States the 5-in. gun is excluded from the same armament, and is described as an anti-torpedo gun. There is, no doubt, an increase in the power and calibre of the minor armament of British battleships. The 12-pr. of the Dreadnought has become the 4-in. of the later ships, and there is no certainty that larger calibres still will not be introduced. It is no secret that some officers, in view of the ease with which modern guns can be handled, would like to advance direct to the 6-in. But here questions of weight and space assume prominence, and it is not certain that more would not be lost than gained by the adoption of a gun which might be unnecessarily powerful for the attack of destroyers and not sufficiently powerful to take part in action at long range. Certainly in Germany there are many officers who think that the overcrowding of the Nassaus with a large main and secondary armament has seriously impaired their value. They are admitted in many quarters to be much over-gunned for their displacement. In relation to this matter, it is interesting to note that "Nauticus" gives currency to a rumour that the British Navy proposes to return to a lighter and more rapid-firing anti-torpedo gun than the 4-in.

But if there is a tendency towards unity of calibre there is also a tendency abroad towards unity of projectile. This is as visible in the sea service as it is in the land service, where the "Einheits-geschoss" of Ehrhardt and Krupp is intended to displace both common shell and shrapnel. Perforating shell, semi-perforating shell, shells of large capacity, shrapnel and other types, have caused complications, which foreign ordnance experts are evidently seeking to diminish. The French, following a British lead, have made an advance in this direction with their *obus alourdi*, which is designed to combine the effects of the perforating shell and the explosive shell, by having its walls of sufficient thickness to withstand impact, perforate all medium thicknesses of armour, and burst behind, with a large charge

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of explosive and a properly adapted fuse. The heavier, longer projectile demands greater energy from the gun, and in flight may be less stable and more subject to "pendulum motion," though it may also be less subject to the influence of wind. How far other navies have progressed in this direction it is impossible to say, but there exists a considerable body of naval opinion on the Continent which now attaches great importance to the use of large capacity, high-explosive shells, not intended to penetrate heavy armour, but to cover an enemy's ship with a rain of fire.

United States.

Fire control.

According to American papers, the United States Navy Department has decided to instal in certain battleships an experimental compartment below the deck, to be known as the "plotting-room," and to be used as a sort of clearing house for all messages transmitted in connection with range-finding operations and control of fire. In connection with this arrangement, further investigation is being made respecting the best method of transmitting messages. At present most of the ships use the voice tube, electrical transmission, and the telephone. The mechanically-operated device, consisting of visible signals operated electrically or mechanically, appears to be regarded with most favour. This system was adopted many years ago, and was employed in the "battle order indicator." It is now commended because of its simplicity. Some of the ships recommend the telephone, which, however, presents some difficulties of communication. Experiments with improved voice tubes have been made at the Boston Navy Yard. The system of fire control is being improved constantly in accordance with the views of observers during firing.

It is now generally believed in United States ordnance circles that the gun, using the new type longer projectiles with sharper points, has definitely conquered the armour-plate, even at 10,000 or 12,000 yards. The projectile will perforate armour at some 20 per cent. greater range than its predecessor, and it will penetrate approximately 15 in. of hard-faced armour at 10,000 yards.

Trials took place in Chesapeake Bay, the old ram Katahdin being the target, with two ranges of plating built up on board, one being 12 ft. by 16 ft., and the other 20 ft. by 35 ft., and the plates, some of which were curved, were of the Harveyed hard-face type, varying in thickness from 8 in. to 12 in. The attack was made by the 12-in. guns of the monitor Tallahassee, ex-Florida, firing 870-lb. projectiles, with an initial velocity of 2500 ft.-secs. Four hits were made on

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each target at a range of 8000 yards. According to the official report, one shot which struck the 8-in. curved plate of the smaller target and two which struck the 10-in. plate, also curved, of the larger target, penetrated completely. The fourth shot struck the roof of the forward target and glanced off. The projectiles used contained no explosive, but were loaded with sand. The test was regarded by ordnance experts as indicating that the armour-piercing shells now used by the navy would be likely to penetrate the armour-plate of an enemy's battleship without detonating the explosive contained in the shell. The range was restricted to 8000 yards by the limitations of the range-finder, but it was considered by many that all necessary information could be gained with firing at that range. A further series of trials is contemplated.

Armour trials.

The battleships New York and Texas, which were authorised by Congress last June, will each mount ten of the new 14-in. guns, of which important tests took place against armour at Indian Head in November. The projectiles used were of cast steel, being made according to the Hatfield process, and the results were eminently satisfactory. One shell struck a taper plate 10⅞ in. at the point of impact, perforated the plate, cleared the butt, travelled 100 yards further and buried itself in the earth. When it was recovered, it was found intact, only a little piece being broken off the point. Another shell perforated an 11½-in. plate with similar results. The Midvale Company produced the gun, and when tenders were opened for 14 sets of gun forgings for the new battleships—it being arranged that the remaining six guns could be purchased by contract complete—that company and the Bethlehem Company were the only constructors who tendered, their offers being identical—30 cents per lb. for nickel steel for the tube and inner layers, and 21 cents for the gun steel for the outer layers. The contracts were equally divided. The Chief of Army Ordnance offered to manufacture the guns at the Watervliet Arsenal, N.Y., for considerably less than the private contractors, taking cost of forgings into account, and the latter will therefore be obtained under the contract. The forgings will be finished at the gun factory at the Washington Yard.

Rear-Admiral N. E. Mason, Chief of the Bureau of Ordnance, communicated some interesting facts and views to the House Committee last December. Discussing the employment of the new projectiles and the probable range for opening action, he was disposed to fix the latter at 10,000 yards. The difficulty of seeing the target at greater ranges limited the range. At 10,000 yards nearly all of a battleship was above the horizon as seen through the sights of a gun 25 ft. above the water, and although the target was small it gave a

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very fair point of aim in perfectly clear weather. At 15,000 yards all, or nearly all, of the actual hull of the vessel dropped below the horizon, leaving only the superstructure and upper works visible, so that the actual size of the target was reduced by perhaps one-half, while at the same time its apparent size, as seen through the telescope, was reduced by about fifty per cent. more. A little motion of the ship, or the rolling of a fair-sized wave, would completely obscure the target most of the time. More important still, all systems of range-finding, said Admiral Mason, failed at distances beyond 10,000, or at most 12,000, yards.

Extreme ranges.

It was useless to think of hitting an object 10,000 or 15,000 yards distant unless the range was known very accurately. All the sources of inaccuracy at short ranges were exaggerated as the range increased, and their cumulative effect at 15,000 yards was such as to make it doubtful whether a hit at that range could be regarded as anything more than a matter of good luck. That it was possible to get fair accuracy at 10,000 yards was due to the fact that the range-finders worked fairly well up to that distance and to the flat trajectory resulting from the very high velocities of the latest guns. At 25,000 yards the whole of a battleship would be below the horizon except perhaps the tops of the smokestacks, which are too small to be seen through the sights at such a distance. At 20,000 yards the conditions would be somewhat better, but the strip of the upper works which would show above the horizon would be too narrow to be of any real value as a target. In land firing seeing the target was not necessary, on account of the ease with which the range could be determined, but at sea the instruments for range-finding were necessarily small and self-contained. In their most improved form they have a base of only about 9 ft. A slight shock would put them out of adjustment, but with a perfect adjustment they give good indications up to about 8000 yards, and fair indications even at 10,000. "At the best no one would think of trusting them above 12,000."

Turning to the question of the explosives employed, Admiral Mason said that powder could now be kept "indefinitely." "It is drowned—that is, it is put in distilled water and soaked. Powder received now could be kept ten or 15 years without re-working." Sir Hiram Maxim had offered some criticism of American powder, ascribing gun disasters to the use of "multiple perforated powder," but Admiral Mason holds that there is no evidence to show that the powder is at fault. He said these accidents had always been due either to weakness in the design of the gun, or method of assembly, combined with flaws in the metal, or to errors in the weight, selection

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or handling of the powder charge, and doubtless he meant also of the breech-closing arrangements.

Erosion of guns.

The Admiral's remarks on the important subject of erosion were also full of interest. He said that, using the highest pressures and highest velocities throughout the firing even of one full allowance of ammunition, the accuracy of the guns would be greatly reduced, though they would not necessarily be useless. To meet this danger the Bureau is being supplied as fast as possible with a 25 per cent. reserve of guns. This incapacitating of the guns of a ship, the Admiral said, would leave her in bad state for a second engagement, unless there could be devised a way to prolong the life of the guns considerably beyond the 100 or 150 rounds which are now the apparent limit. Very little progress has been made in preventing the erosion of the guns. The compounds introduced into the smokeless powder reduced the erosion somewhat, but at the same time reduced the ballistic powers of the powder more than was safe. Erosion is caused by large charges fired with a very high temperature of explosion. In guns of lower velocities, lower pressures, and smaller charges, but of the same calibre, the erosion is much less. At present, said Admiral Mason, the question was one of either reducing the power of the guns, carrying a heavier weight in the ship to do the same work, or of wearing out the guns. The 50-calibre guns for the Arkansas and Wyoming, erode very rapidly at the top of their limit, and it may be found necessary to make some reduction in their power. While not certain, the Admiral believed that the 12-in. gun for those vessels is more powerful than the 14-in. gun now being built for the Army. He did not think the Army 14-in. could compare with the Navy 12-in. 50 calibre, in striking power, because the higher trajectory of the Army gun makes the chance of hitting less. The Navy 14-in. for the new battleships is of considerably higher power than the Army gun. It is true that there would be a large reduction in erosion in the Army gun fired from a fixed emplacement, but such a gain in erosion at sea would be purchased at too high a price, since it would involve a sacrifice of the very features which have made possible the extraordinary improvement of the last ten years in naval gunnery—the high velocities, the flat trajectories and the long danger spaces characteristic of present guns. The guns of the largest calibres are fired in American target practice from 16 to 20 times a year. At the end of 100 rounds the latest, newest guns of all would have to be relined. It would take from two to three months to reline the guns of the Battleship Fleet after an engagement. By working overtime it might be done in a couple of weeks. Little

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information could be obtained, Admiral Mason confessed, as to the trouble foreign nations were having with erosion. The Bureau had tried to get that information without success. He thought foreigners did not work their guns as hard in practice as Americans do. The process of relining, the Admiral said, could go on indefinitely. The relining of a 12-in. gun costs from 8000 to 10,000 dollars.

Cost of relining.

Admiral Mason's remarks on the question of sights, mountings, and the remodelling of old guns, show the existing conditions in the United States Navy. He said the remodelling of the sights and mountings, which is now in progress, would, when completed, make further change unnecessary. To manufacture these sights and mountings, etc., 587,000 dollars would eventually be needed. The alterations will probably run on for two years. Telephones are needed for the torpedo defence guns, because the information must be supplied almost instantaneously. For the larger guns visual instruments are used to convey information. The sights can be changed from one gun to another without injuring their efficiency, with proper adjustment, of course. That is one reason why the old guns are being rehabilitated and fixed up. The proposal now is to modify the 6 in. Mark VI. guns by hooping them to the muzzle, and lining where necessary to make them spare guns for Mark VIII. guns, and to provide a few new Mark VIII. guns to bring up the number of spare guns. There are about 116 Mark VI. 6-in. guns now in the Service. Hooping to the muzzle will cost about 700 dollars, and relining each gun will cost about 4000 dollars. The reserve for the Mark VI. guns is complete, but there is no adequate reserve for the Mark VIII. To give a proper reserve for the latter type, at least 30 more are required.

Tests were made in November, by the authority of Congress, with Mr. Isham's high-explosive shells against the side and turret armour of the monitor Puritan. The shells were not fired from guns, but placed against the armour and detonated, the object being to test the effect of outside explosion. An official report has been presented, and it was shown that the results did not justify any hope as to the really effective value of shells of this class so used. The explosive was that known as "explosive gelatine," well known as the most powerful of all the nitro-glycerine compounds used for military or blasting purposes, and one of the most sensitive of such compounds. The charge was in each case 200 lb., which was believed to be the largest charge of this explosive ever detonated. The Puritan was selected because, although much weaker in resisting power than a modern battleship, she was perfectly available, and was considered to present more favourable all-round conditions for the test than any other ship

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which could be used at the time, it being recognised that a test so extreme could not fail to result in damages serious enough to call for repairs which might cover considerable time. The turret armour of the Puritan has a thickness of 8 in., as against 12 and 14 in. in battleships of latest design, and the side armour at the point attacked was 10 in. thick, tapering to 5 in. at the lower edge of the belt. The Puritan's belt armour extends only about 3 ft. below the normal water line, and only 2½ ft. below the existing water line at the time of the test.

Puritan trials.

The explosion against the turret armour set back the plate against which the charge was placed, dishing it considerably and opening a number of deep cracks, some of which probably extend through the plate. The seams between this and adjoining plates were opened, as were also those between the next two plates. It was not known whether the turret could be trained, as the test of this point could not be made until certain plates which had been inserted between the turret and the barbette could be removed, but no pipes or joints in the mechanism were disturbed, and there was no evidence inside the turret of any disturbance whatever. Two chickens and a cat, which had been placed in the turret at points where the crew would be stationed for working the guns, were entirely uninjured. It could be said that, as far as was apparent, the turret was not in any sense vitally damaged.

The second charge, against the armour belt, buckled the plate against which the attack was directed, swinging the ends of the plate outward and opening up the seams at the ends. The lower edge of the plate was also buckled outward, opening up a longitudinal seam below water, and starting a bad leak through which the water-tight compartment affected was rapidly flooded. It was impossible to say what damage was done below the armour belt, but there was no indication that this was serious. The narrowness of the armour-plate undoubtedly contributed very largely to the result produced. The wider plates of a battleship's belt would have resisted buckling more effectually, and the longitudinal bulkhead, which exists in all modern ships, would have confined the flooding within narrow limits. As a result of the firing free access of water was given to the whole of a large compartment running entirely across the ship, and the stern settled about 12 in., and at low water touched bottom. There has since been some difficulty in raising her. While the attack to which she was subjected was such as would never occur in practical conditions of warfare, it was probable that important lessons might be drawn from the results in connection with the manner of backing armour to secure the maximum defence against any kind of attack.

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Texas trials.

More important trials were made in Chesapeake Bay on March 21 and 22 of this year, when the old battleship Texas, now renamed San Marcos, was used as a target. The San Marcos was launched in 1889 and completed in 1892. Her protection was a partial 12-in. steel belt, 12-in. armour on bulkheads, turrets, redoubt and conning tower; 6 in. on the ammunition hoists, and a 3-in. deck. These trials were intended to show the value of the "spotting" system, to give information as to the effect of modern gun fire on an armoured vessel and her fittings, and to settle some vexed questions concerning the flight of projectiles and their angle of impact. The new Hampshire, which had been selected to do the firing, is a modern vessel, launched in 1906, and completed in 1908. She carries four 12-in., eight 8-in. and twelve 7-in. guns. The 12-in. guns are 45 calibres in length, and fire a projectile of 870 lb., while the 8-in. gun fires a projectile of 260 lb. The following account of the firing is condensed from reports in the *Army and Navy Journal* (New York), and other American papers.

On March 21, twenty volleys were fired from the 8-in. and 12-in. guns. The firing took place at ranges varying from five to seven and a half miles. The day was clear and ideal for the test. The firing began at twenty minutes to seven and lasted throughout the day, the last volley being fired at half-past six. As a rule each volley, or salvo, consisted of four 12-in. and four 8-in. shots The New Hampshire was especially fitted with two extra crow's-nests on the two fire-control masts. These were to accommodate the fifty-five officers assigned to the New Hampshire for spotting duty. After they plotted out the firings, the U.S.S. Des Moines, the observer's ship, sent back the results by wireless.

Mr. Meyer, the Secretary of the Navy, went to the San Marcos before the firing began, and inspected the vessel. He gave minute attention to the preparations made to gauge thoroughly the effect of the shells, and to the arrangement, or lay-out, of the range-finders. These were placed in two or three places, such as the turrets and the bridge, so that the effect of the various shots, principally the explosive ones, on these delicate instruments, could be tested. The representatives of the press were informed in a letter delivered to each reporter that the Department did not desire to have any technical data given out as to the results of spotting practice, the damage sustained, or the effect of the high explosive projectiles. The letter stated that "it was not the object of the firing to hit the vessel at every salvo, but to give the spotters practice in determining the fall of the projectiles and in removing the mean point of impact from one point to another with regard to the target, correcting each salvo by the one that has gone before."

Firing was continued on March 22, and at the close of the volleys the San Marcos lay deep in the mud, with the water halfway between the gun and berth decks. One of the masts was cut about halfway between the deck and the fighting top, and the other mast was riddled. The principal damage inflicted in the second day's firing was the demolition of the conning tower or battle command station, the side of which was blown out. All the fire-control and other fittings in the conning tower were transformed into a twisted mass of steel. Along both sides were large rents in the armour. One shell went clear through the old battleship, tearing a path about two feet wide. The dummies representing sailors in the fighting top were unscathed, owing to the fact that the gunlayers had been ordered to confine their fire to the hulls and the turrets. A raging fire inside, caused by an explosive shell, made it impossible, after the first day's firing, for the observers to go below the main deck. It was said that the damage done in the two days could have been inflicted in fifteen minutes if all the shots had been fired with the intention of making hits instead of providing practice for the spotters. The damage is mainly ascribed to the semi-armour-piercing shells containing high explosive, ignited by a delayed action fuse.

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Mr. Meyer's report.

The following statement was issued by the Secretary of the Navy in regard to the firing:—

The results of the firing have furnished us with most valuable information on the important questions that arise in the consideration of the preparedness of the Fleet for actual battle. The firing has conclusively proven that our system of training is the best, and the total wreck of the San Marcos has impressed every observer of the accuracy of fire and the destructive feature of our projectiles. As the practice primarily was for the education of spotters in estimating the errors in range at distances of five to seven miles, it was intended to have the salvos so placed that few projectiles would hit the vessel, so that we might use her again next year for spotting practice. Almost all the salvos were fired so that they would fall at varying distances for the education of the spotters, but in order to observe the fire of our projectiles on an actual armoured vessel a few of the salvos were directed at the target itself, and we got a great many hits from these salvos. I noticed on one salvo that four 12-in. projectiles fell in a bunch, all of them striking the vessel and causing dreadful havoc.

The New Hampshire placed the salvos anywhere she wanted, and when the gunners wished to have some hits on the conning tower and the turret armour in order to observe the effect, they had no trouble placing the shots at from 10,000 to 12,000 yards range at just the point desired. A few projectiles were directed against the masts, so as to show what would happen to the exposed communication systems. An inspection of the vessel after the firing showed immense holes which had been ploughed through from one side to the other, many of them being below water, and any one or two of them being sufficient to make the vessel a total loss. The armour of this vessel was unable to withstand the impact at the very great range at which we fired, and the battleship was a total loss after the first two salvos were directed at her.

All the officers of the Fleet were deeply impressed with the accuracy and the great destructive effect of the projectiles. All the manikins which were placed at the guns representing the crews were dreadfully cut to pieces, and the fumes and fire left by the passage of high explosive projectiles would have destroyed every living thing. The bulkheads in places were live sieves, due to the action of high explosives, and all the compartments below were completely riddled. It was remarkable to note the enormous power of some of these projectiles, which at 12,000 yards went through the heaviest armour and continued their work of destruction inside the vessel. This practice has demonstrated beyond doubt the immense value of the long-range firing we have been having for the last two years, and shows that our methods of training are positively the best. Our officers have seen all the practices against the canvas target screens, and have been thoroughly satisfied with the work of our gun pointers and fire-control parties, but it needed just such an exhibition as this to prove that their enthusiastic and continued efforts to bring the Fleet to the highest state of actual battle efficiency have met with entire success. It is also a most forcible lesson, showing that nothing can be left undone during the period of preparation to ensure perfect success. It is very satisfactory to visit the vessels and to talk with the officers where the efficiency of the Fleet for battle in gunnery, engineering, and manœuvring are the sole topic of discussion. It is very pleasing to find the marked evidences of efficiency, and to note at the same time that every effort is being made for still further improvement.

There was no doubt that the San Marcos was a total loss very shortly after the firing began, and all hopes of raising her were given up. There are a dozen places where holes from four to six feet in diameter go right through from side to side, cutting away decks, beams, bulkheads, stanchions and armour as if they had been made of paper. The under-water hits, of which there were a great many, did the most damage, and the fact that the vessel sank at the second salvo of high explosive projectiles prevented many fires that would otherwise have been started. As it was we had a roaring furnace on the gun deck in two different places and in the conning tower, which the two fire tugs got under control after an hour's effort. The upper works were absolutely riddled. There was not a single halyard or a means of communication left. The chart house was a mass of splinters after the first projectile, and the decks were cut through as if an enormous pair of shears had done the work. One or two salvos from any one of our Dreadnoughts will accomplish the same destruction. Of the salvos which were actually directed at the target, the percentage of hits at that great range was away beyond expectation. The spotters have for the first time gained the necessary information which cannot be learned by firing against anything but a real vessel. Their estimates of distances over and short—as the

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fleet gunnery officer intentionally placed some shots hundreds of yards away from the target—were reasonable for their accuracy, even though at certain times during the firing the mirage and other unfavourable light conditions might well have confused them had they not been so expert through the system of preliminary training adopted.

This, in my opinion, has been the most valuable experiment and instruction we have ever had, and it gives us great confidence in our new ship designs, in our system of training, and, more than all, in the results obtained from the intelligent enthusiasm of the *personnel*.

France.

An ordnance question of great importance and difficulty has had to be settled by the French Admiralty recently: Should the two ships which are to be laid down in August be armed with the 12-in. 50-calibre gun, as mounted in their predecessors, the Jean Bart and Courbet, or should the type be changed, and the 13·4-in. gun introduced, which the Ordnance Department has designed, and which the Ruelle factory has in hand? Many officers are well pleased with the existing gun, though experts have shown that the limit of its resistance has been reached. The 12-in., Mark 1902, firing the heavy projectile, 970 lb., striking at an oblique angle (angle of fall 18 degrees) would, it was estimated, perforate 18·5 in. of steel at 4000 metres (4375 yds.), 16·1 in. at 6000 metres (6562 yds.), and 14·1 in. at 8000 metres (8749 yds.). The guns of the Danton and the Jean Bart are still more efficacious. The Iéna trials gave proof of the enormous damage executed behind armour by the 12-in. gun. By increasing the calibre, it should be possible to increase the internal capacity and the explosive charge, and thus to make the shell more destructive still. On the other hand, the opponents of the larger calibre pointed to the complications arising from increased weights, and the disadvantages of a slower rate of fire, besides other inconveniences.

Admiral Boué de Lapeyrère, the late Minister of Marine, was in favour of the larger calibre, and his department did not view without regret the necessity of completing costly ships, which, on entering the Service, will have guns inferior in power to those of other navies, or at least of the British Navy. The 12-in. gun, Mark 1906, was barely equal to the requirements of the modern attack, in view of progress in the manufacture of armour, and its own limit of resistance was almost reached. Certain evidence of strain, in tests at Ruelle, with pressures exceeding the normal only by 660lb., had given sufficient warning on the latter point. In weight of projectile, initial velocity and pressure, the limit had, in fact, been attained, and if better results were desired, there was no choice but to increase the calibre. Moreover, subsequently, some mishaps occurred in firing, causing

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no serious damage, and resulting, it was said, from insufficient experience, and the unaccustomed angles at which the guns were laid; but this also showed that the existing guns have given the best results of which they are capable.

The various questions were brought before the Superior Council of the Navy in January, and appear to have been fully discussed. Certain points were laid down for consideration. There must be superior efficiency to make up for the numerical inferiority of the French Navy. Better guns, with sufficient rapidity of fire, were necessary to attain superiority of fire. The existing gun was good up to its limit, but there could not be too much perforating power, nor too great a capacity in the shell for effective use in the long range actions which may be anticipated in the future, and in view of new advances in armour production. To strike hard and fast, and to go on hitting, was the surest way, and the most economical, to attain the results desired. The new 13·4-in. gun designed by the ordnance authorities, and actually in course of making, would fire almost as fast as the 12-in., and would discharge a heavier shell, nearly 600 kilos (1323 lb.), containing a much larger explosive charge. Increase of calibre was the only way of adding power to the ships, and by holding to the 12-in. gun France would adopt the position of inferiority.

French gun disposition.

In regard to the distribution of guns, the following points were brought forward by the advocates of a new design. The American and new British system of placing the guns on the middle line presents many advantages in giving a full broadside fire, while fire ahead and astern may be secured by placing one turret in such a way that its guns can fire over another turret, and possibly by introducing a triple turret for the guns of the lower level. The *échelon* plan was not advocated. As to the possibility of adopting a new plan, M. Lyasse, who designed the Jean Bart and Courbet, had prepared plans for ships of 24,000 and 25,700 tons embodying the proposed change in the calibre of guns: (*a*) five twin turrets for 13·4-in. guns; (*b*) two triple and three twin turrets for guns of the same calibre. Some considerations were offered also in regard to the description of the secondary armament of 5·9-in. guns.

These, of course, were very serious considerations, but there was a disagreeable alternative. If the new gun was to be mounted in the ships of 1911 those ships would be delayed. Admiral de Lapeyrère said in February he should not be prepared to adopt the new gun until after exhaustive experiments with the trial weapons which were being manufactured at Ruelle, and these tests could not take place until July. Meanwhile it was highly important to issue

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orders for the armaments of the new ships. On these grounds it was ultimately decided to forego the advantage of introducing the bigger guns until the ships of 1912 are laid down. This decision was perhaps inevitable, but it was regretted by the forward school, and Admiral Bienaimé deplored in the Chamber that it was necessary to adopt a gun which, though it looked well on paper, was really unequal to the enormous pressures that were required.

With regard to the gunnery of the French Navy it is worthy of note that a new spirit is at work, and that the adoption of a competitive system is leading to better results. There was some disappointment that the records of 1910 were not superior to those of the previous year, and also at the fact that the decision of the squadron officers on the results were over-ridden by the superior authorities of the staff, who treated the "umpires" with little respect. Two old coast-defence ships were used as targets in 1910, the Fulminant moored in the shallow water of the southern passage at the Iles d'Hyères, and the Tonnerre in Quiberon Bay. The Fulminant had been so plated that her side formed a rectangular target, 180 ft. 6 in. long and 26 ft. 3 in. high. The fault of such firing is that the target is stationary, but the vessels firing did not know the exact range, because they were instructed to follow a leader whose captain received sealed orders at the beginning of the exercise. The Second Squadron ships steamed at 12 knots, the Patrie, République, and the cruisers of the First Cruiser Squadron at 14 knots, and the four ships of the Justice class at 14·35 knots. The ranges varied between 5600 metres to 7200 metres. In the First Squadron the figure of merit for the battleships was 15·2, and for the cruisers 11·4, while for the Second Squadron the respective figures were 15·5 and 19·5, the mean of the whole fleet being 15·2.

Battle practice.

The following were the best firing ships, the first figure showing the hits within the rectangle and the second those outside. Jauréguiberry, 30, 11; Justice, 20, 4; Dupetit-Thouars, 37, 10; Démocratie, 17, 5. In the Staff computation, however, the Jauréguiberry was disallowed on grounds of irregularity, and the Justice was also left out of the account. In the First Squadron the Démocratie was brought to the head of the list, followed by the Ernest Renan, while the Dupetit-Thouars led in the Second Squadron. There was also a new figure of merit, being in the case of these ships severally 45, 38, and 33 per cent. The pride of place and the cup were awarded to the Démocratie on the ground of superior general efficiency and better firing methods. Admiral Touchard did much to encourage good gunnery. Admiral Germinet has done still more, and Admiral Le Bris and the officers of the gunnery school have conduced largely

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to the good results, which, however, it is freely admitted, mark only a good advance towards the object in view.

Schneider torpedoes.

In relation to torpedoes there appear to be two currents of thought at work in France—one attaching the utmost importance to great range, speed and high explosive power, and the other, admitting these requirements for battleships, but arguing that for destroyers a swift torpedo of lesser range is desirable. The only point in this is that too much may be sacrificed to range in torpedoes to be used for the purpose for which they will be mostly used. For the past three years MM. Schneider have been devoting great attention to the manufacture of torpedoes for both these purposes, and their works are at Creusot, Harfleur and Hyères, at which last-named place they have built an artificial island, known as the "Batterie des Maures," of reinforced concrete, enabling torpedoes to be discharged from submerged and above water tubes, with a range of 6562 yards. The Schneider torpedoes are made in conformity with the requirements of the French Navy, and generally to be used in existing tubes without modification. The firm felt that these considerations limited their enterprise, but they nevertheless have produced an arm of very great power.

Some description may be interesting. The motor is a four-cylinder Brotherhood, recommended because of the simplicity of its parts, the facility of its control, and the ease with which it may be opened up. Experience shows that this motor, though intended for use with cold air, answers admirably with hot air, applied on the Gesztezy system, in which MM. Schneider have the rights. The spring pressure regulator was regarded as a particularly good feature of the torpedo by the French Committee, which was present at the trials. The starting mechanism is different in details from other types, especially in the connection with the range regulator, operating by means of compressed air, which acts on a piston instead of a spring. This arrangement improves the system of stopping the torpedo, and is particularly advantageous in running torpedoes for exercise. The Schneider immersion regulator works with great precision, and preserves its efficacy, whatever may be the depth for which the torpedo is regulated before discharge. The servo-motor is of the compressed-air type, and has received high commendation as conducing to great accuracy of running in regard to depth of immersion and aim. The screws, gyroscope, etc., do not call for remark. The Gesztezy heating system is special in its injection of fresh water into the chamber where the combustible liquid is burning, so that steam is mixed with air and the products of combustion. This arrangement makes it unnecessary to exceed a temperature of 392° F.

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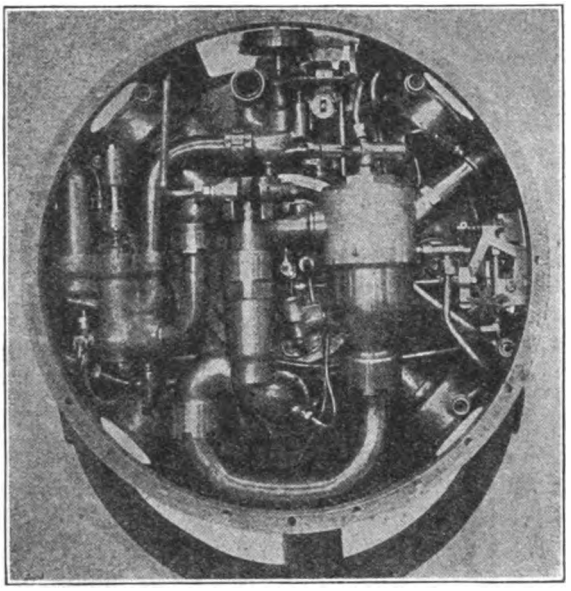
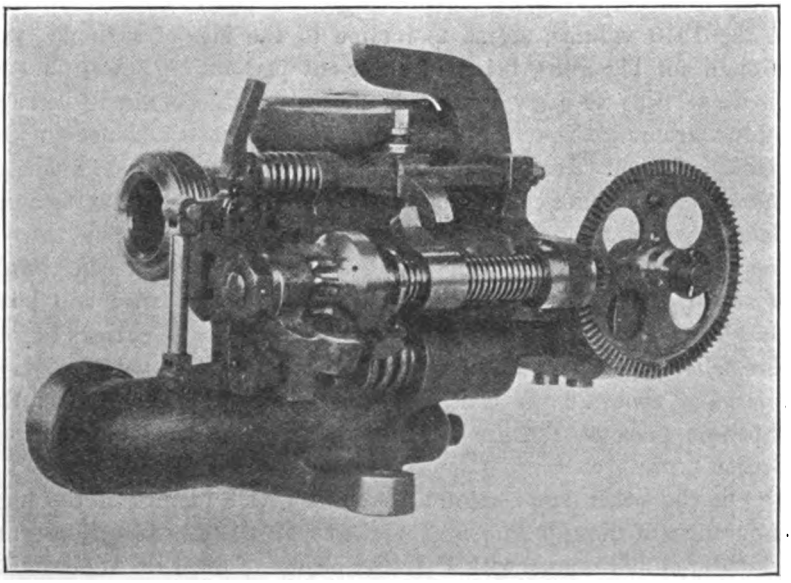
SCHNEIDER TORPEDO MACHINERY.



Engine and Reheating Chamber.



Starting and Stopping Mechanism.

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in the cylinders of the motors, which relatively low temperature enables bronze to be used for parts of the engine. There is also automatic regulation of temperature.

There are three types of the Schneider torpedo—the 17·7-in. for cold air, the same for hot air, both adopted for the French Navy, and the 21-in. hot air improved type torpedo, which is still under trial. The 17·7-in. torpedoes carry normally 220·5 lb. of explosive, which may be increased by 22 lb. The weight, ready for service, is 12·9 cwt. in the normal type, and the length 16 ft. 9 in., and in the long type 13·4 cwt., with a length of 17 ft. 9 in. The normal type is intended for use at ranges up to 650 yards, while the long type preserves its highest speeds up to 1100 yards and more. The new 21-in. torpedo is a formidable arm, with a speed of more than 50 knots at 1100 yards, and a range at 25 knots of over 6500 yards. The explosive charge is 331 lb., and the total weight is 23·6 cwt. This torpedo is intended for use in battleships, but another 21-in. type is under investigation, intended for large submarines, with higher speed up to 1100 yards and an increased explosive charge.

GERMANY.

Krupp guns.

Not much is allowed to be made public concerning the ordnance and gunnery of the German Navy. Questions of calibre, of heavy and medium guns, of their disposition on board ship, and of the projectile to be employed, have assumed great importance. "Nauticus," in the 1910 volume, seems to incline to the idea of a single type of shell for big guns, being of sufficient perforating power, and at the same time to carry a bursting charge capable of doing damage behind armour. The Germans have very great confidence in the quality of their Krupp guns, and assert that they have a longer *Lebensdauer*, or life, than the British wire-wound guns. General Bahn has for the past three years been insisting on the real or supposed advantages of the German guns in the *Artilleristische Monatshefte*, and he asserts that the latest foreign wire and hoop guns are inferior to the Krupp type. It is perhaps curious to find this belief supported in "Nauticus" by the fact that we consider a reserve of about 25 per cent. of guns necessary. The case of the Japanese guns at Tsushima is also adduced as depreciative of the British type.

On the other hand, we are presented with a picture of the high endurance of Krupp guns. There was an 8·2-in. 45-calibre gun, which fired 390 rounds with a powder charge of 69·4 lb. to 83·78 lb., and initial velocity from 2789 ft.-secs. to 3083 ft.-secs., and another gun

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of the same calibre, which fired 508 rounds without any considerable increase of dispersion or reduction of hitting power. There was also an 11-in. 45-calibre gun which fired 192 rounds with 209·4 lb. to 235·9 lb. of powder, and initial velocity of 2766 ft.-secs. to 2805 ft.-secs. without any untoward (*nachteilige*) consequences. The powder chamber was lengthened to the extent of 3·5 in., but the number of rounds was increased to 207 without detriment to the accuracy of the gun. These details are given in the latest volume of "Nauticus," but we are under the impression that they are not quite recent.

The question of the introduction of a larger calibre of gun than the older types is now evidently occupying great attention in Germany. In the first "Dreadnoughts" the heaviest gun is the 11-in., and the 12-in. is taking its place in their more recent successors. The question of increased weight and slower firing is felt to be a great disadvantage, and the triple turret is beginning to be discussed again in view of the designs of the new ships of other Powers. Such a plan was considered some years ago in Germany, but the project was abandoned. The gun constructors are, however, ready to provide a more powerful gun than any yet mounted in German ships, and one possessing remarkable characteristics.

How far the increase in the power of German ordnance has been carried into practice is, however, at present unknown, but a gun of larger calibre than the 12-in. appears for the first time in the Krupp list of naval and coast guns. It is a 35·5 cm. (13·976 in.) gun, firing projectiles of 1366·8 lb. at the rate of from one to two rounds per minute, as compared with the 859·8 lb. projectile of the 12-in., fired at the rate of from two to three rounds per minute. The new gun is designed to be made in three lengths—40, 45, and 50 calibres—and in two weights. The following are particulars of the dimensions, weights, and muzzle-energy of the three calibre-lengths of the gun:—

	40 cal.	45 cal.	50 cal.
Length . . . . . ft.	49·6	55·4	61·2
Length of bore . . . . „	46 6	52·4	58·1
Weight, light . . . tons	59·24	66·61	74·20
„ heavy . . . „	65·67	74·00	82·37
„ of charge . . . lb.	420·9	493·8	564·2
Muzzle energy . . foot-tons	71,978	80,597	89,283

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The ballistic characteristics are as follows :—

—	40 cal.	45 cal.	50 cal.
	ft. sec.	ft. sec.	ft. sec
Velocity, muzzle	2,760	2,913	3,068
,, 2,000 metres (2,187 yds.)	2,536	2,690	2,838
,, 4,000 ,, (4,374 ,,)	2,333	2,477	2,612
,, 6,000 ,, (6,561 ,,)	2,133	2,271	2,402
,, 8,000 ,, (8,748 ,,)	1,955	2,080	2,198
	yds.	yds.	yds.
Range, 5 degrees elevation	10,350	11,294	12,084
,, 10 ,, ,,	16,568	17,880	19,138
,, 15 ,, ,,	20,833	22,309	23,698
,, 20 ,, ,,	24,607	28,757	30,126

Penetration, steel shells direct hits.	Unhardened Steel Plate.			Hardened Krupp Nickel-steel Plate.		
	40 cal.	45 cal.	50 cal.	40 cal.	45 cal.	50 cal.
	ins.	ins.	ins.	ins.	ins.	ins.
Muzzle	42·48	46·06	49·53	31·10	33·85	36·41
2,000 metres (2,187 yds.)	37·77	41·06	46·81	27·56	30·11	32·48
4,000 ,, (2,374 ,,)	33·46	36·46	39·37	24·60	26·77	28·93
6,000 ,, (6,561 ,,)	29·52	32·28	34·92	21·65	23·62	25·59
8,000 ,, (8,748 ,,)	25·98	28·46	30·86	19·09	20·89	22·63

Krupp trials.

Although no definite information is accessible regarding German progress in armour, it is reported that some considerable advance has been made. In October important trials were in progress at the Krupp proving ground at Meppen, in the presence of representatives from the Imperial Navy office. A target is said to have been tested consisting of new Krupp cemented armour plates varying from 12 in. to 6 in. in thickness, against projectiles from 4·1-in., 6-in., 9·4-in. and 11-in. guns. According to statements in the German press 30 rounds were fired from a British gun, or gun of British naval type, and also from the new Krupp 12-in. gun. Fifteen different kinds of shells and armour-piercing projectiles are said to have been employed. Chief amongst these, according to statements made, was a new armour-piercing Krupp projectile, to which is attributed penetrative powers exceeding that of previous types. This is doubtless the old semi-armour-piercing shell fitted with a long cap. The target is stated to have been built in such a way as to represent the protection of the secondary armament of the Nassau, with 6-in. screens. Perforation of the exterior armour was effected by a majority of the projectiles used, but only in a few instances did the lateral screens suffer material damage, owing, it is stated, to the insufficiency of the bursting charges. The greatest havoc is said to

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have been done by British, Skoda, and the new Krupp A.P. projectile, which latter is alleged to have demonstrated its marked superiority both in penetration and explosive force. Two shells completely wrecked a target representing a midships section, with 9-in. armour and a 2½-in. deck. The thinner interior plates were shattered to fragments. It is believed that the new projectile is longer than its predecessor, resembling the French *obus alourdi*, and that it has a strong aluminium case which does not extend to the point. The bursting charge attained by the additional length is said to permit an increase of 30 per cent. The aluminium case is assumed to lessen erosion, and probably a copper film on the projectile, attached by the Simpson process, would answer the same purpose.

Ehrhardt guns.

Invention is still active in the design and manufacture of guns to resist balloon attack. In the *Naval Annual* last year particulars were given of the Vickers and Krupp anti-balloon guns, and this year we describe the Coventry gun. The Rheinische Metalwaaren und Maschinenfabrik is also in the field with an Ehrhardt 2·55-in. 9-pr. gun of this class—B.A.K. (Ballonabwehrkanone)—which can be mounted on board ship, but at present has been adopted only for Army use, and was shown at the Brussels Exhibition, mounted on a powerful armoured motor car. The same gun can be made up to a calibre of 4·1 in., with special ship and coast mountings. The Army 9-pr. gun is carried on a car capable of a speed of 40 miles an hour, or up to 43 miles, with special arrangements to sustain recoil at high-angle firing. The following are the mechanical and ballistic details:—

Weight of the gun and mounting	16·7 cwt.
Weight of the car, with gun, 140 rounds, and full equipment	6·15 tons
Weight of the projectile	9 lb.
Initial velocity	2198 ft.
Initial energy	302·8 ft.-tons
Extreme elevation (depression 5 deg.)	75 deg.
Field of fire at any elevation	360 deg.
Extreme range at 43 deg. elevation	12,029 yds.
Height of trajectory at 45 deg.	12,138 ft.
Height of trajectory at 75 deg.	25,957 ft.

By means of a hand wheel the sights are changed for any ascertained or known range. The sights are telescopic, and a moving object can be followed easily, while a patent temperature scale indicates automatically the fuse-setting for any elevation or range. Special arrangements are made for supporting the motor chassis as a gun-platform, making it perfectly rigid. The gun has a horizontal sliding lever breech, with automatic opening and closing arrangements, permitting very rapid fire. The weights of gun and brake are carried low, and the recoil is absorbed without the necessity of

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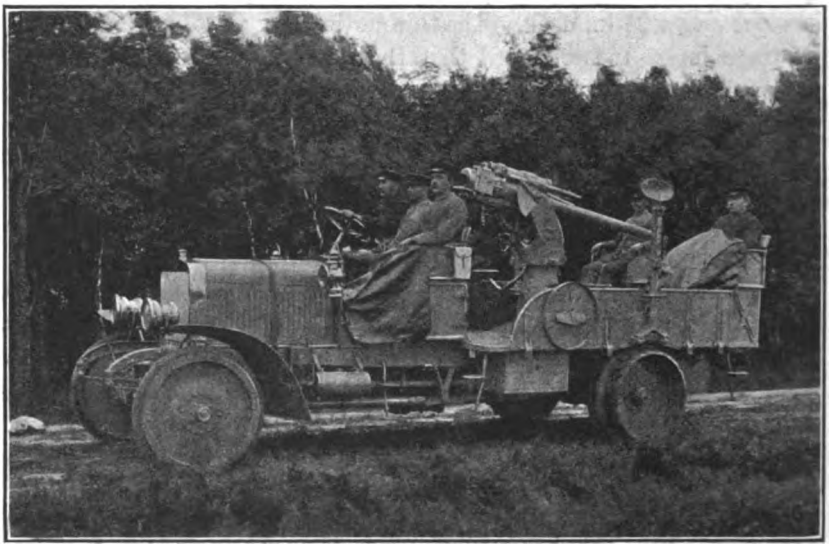
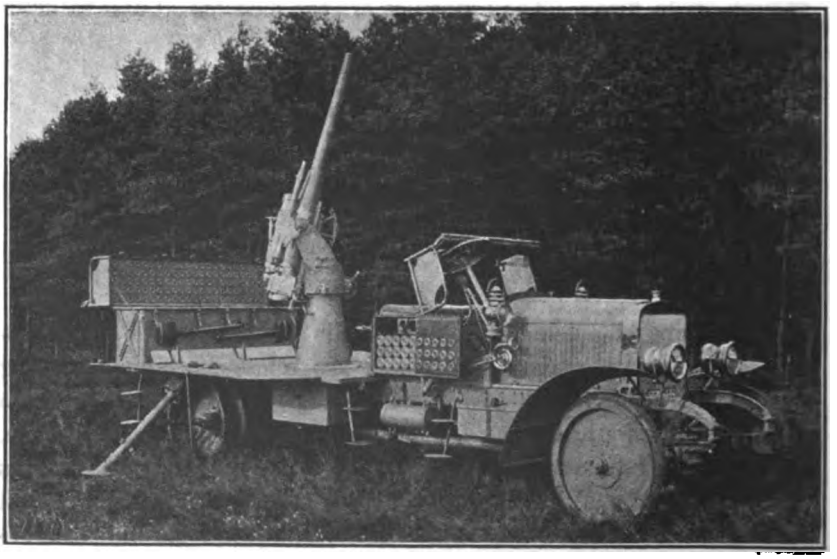
ANTI-BALLOON GUN.

Messrs. Ehrhardt, Germany.



Packed for Travel.



Prepared for Action.

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compensating springs. These features are especially useful in a gun carried on a car, and are such as to enable moderate curves to be taken at high speed. For military use the car carries six men, 140 rounds of ammunition, and 200 litres of benzine. The great muzzle-energy shortens the period of the flight, and flattens the trajectory of the projectile, which is of great importance in the case of a moving object, and conduces to accuracy of aim.

ITALY.

A recent reclassification, or rather renaming, of Italian guns enables us to give particulars of the types now in use. Heavy guns are those which are more than 8·2-in. in calibre, medium guns more than 4-in., and minor guns all of calibre inferior to the latter. Each description shows the calibre in millimetres, the length in calibres, the type, as A. or V., for Armstrong or Vickers, and the year of introduction. The oldest gun of all is the 431/26 A. 1879 (17-in.), with a single hydraulic mounting and revolving shield. Next comes the same gun, dated 1881, with two calibre lengths, 26 and 27, for double hydraulic mountings, as in the Italia, and the latter again, dated 1882, as mounted in the Andrea Doria. Then we reach the 343/30 A., 1887, being the Armstrong 13·5-in. 30-calibre gun of that date, with double hydraulic mounting, as in the Re Umberto, and also with a hydro-pneumatic disappearing mounting, doubtless for fortress use. The first 12-in. is the 305/40 A., 1900, for double hydraulic mounting, with which the Regina Margherita class are armed, and the same gun is shown, with the date 1904, with electric mounting, for the Regina Elena. Then we reach the guns of the new ships, which, it is worthy of note, are described as 305/46 A., 1909, for the Dante Alighieri and Giulio Cesare, with double and triple hydraulic turrets, and 305/46 V., 1909 for the Leonardo da Vinci, also with double and single hydraulic turrets.

In these ships, therefore, the Italians have not gone beyond a 12-in. 46-calibre gun, so far as is at present known, mounting their guns in double and triple turrets; but a correspondent at Rome assures us that the new ships, which are about to be provided for, will mount twelve 13-in. guns in four triple turrets, all on the middle line, and that the displacement involved will be about 25,000 tons. Triple turrets.

The other heavy guns of the Italian Navy are all of 10-in. calibre, increasing from 30 calibres in 1882 (Bausan) to 45 calibres in 1907 (San Giorgio), and the mountings are hydraulic and electric,

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the latter in the Francesco Ferruccio, Pisa, and San Giorgio classes. The latest of the medium guns are the 120/50 A. 1909, on double electric and central pivot cradle mountings, for the Dante Alighieri, and the 120/50 V. 1909, on a mounting of the latter character, for the Leonardo da Vinci class.

Armour-piercing shell.

Reference has been made elsewhere to the importance recently attached in some countries on the continent to high explosive shell. Captain Ettore Bravetta, of the Italian Navy, has for several years devoted attention to this subject, and has devoted several papers to its discussion. A recent contribution of his, translated by Lieutenant van Ludwiger, of the German Navy, in the *Zeitschrift für das Gesamte Schiess und Sprengsstoffwesen*, contends that the introduction of shells of this class must have a profound influence on ship construction. The projectile he has in view is a long shell with thin walls and a properly adjusted fuse, containing from 20 to 25 per cent. of its own weight of explosive. He thinks it should be possible to produce such a shell, which would be safe in use, and which, on exploding, would do enormous damage. There is, of course, the question of safety in the firing of such projectiles with high initial velocity, and of erosion of the tubes, and Captain Bravetta would be willing, at great ranges, to employ a shell which would be perfectly safe, containing from 8 to 10 per cent. of its weight of high explosive.

As to the idea of a single character of shell—"Einheitsgeschoss"—for the Navy, he thinks it attainable, and he cannot regard the French *obus alourdi* as satisfactory, saying that a great number of French officers disapprove of it. Some of his arguments are based on facts recorded by M. Triedler in the Russian *Artilleriskii Jurnal*. This authority says that the shell which had the most disastrous consequences for the Russians in the war was one of large calibre, and he speaks of it as a mine shell, carrying a considerable charge of powder, which burst with a violent exposion and caused a rapid development of gas at high temperature and dense black smoke, which wrought enormous damage. M. Triedler's views are not in all respects those of Captain Bravetta. At medium distances he would use semi-perforating shell, with heavy explosive charges, against the thin plating of ships—a matter, it may be observed, of careful aim. At shorter range he would employ armour-piercing shell containing a certain amount of explosive. He says that the fuses of mine shells must be finely adjusted, and regards the production of thick black smoke as a valuable feature. The so-called "portmanteau" shells of the Japanese were, he says, filled with black powder. Captain Bravetta adds that the only known high explosive at the time that could be used with great initial velocity was ammonal, whose discoverer told

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him at Felixdorf that the Japanese had made inquiries concerning it, but had not made use of it. They had only the Shimose powder, which was picric acid with an admixture, and Captain Bravetta shows the extraordinary difficulties which attend the use of explosives and gun charges of that class, attributing thereto the rapid erosion of the Japanese guns.

But explosives are now known which possess all the requirements for high velocity and safe usage, and he asks what influence may be exerted upon shipbuilding? He takes the Minas Geraes to illustrate his thesis. Here, he says, are masts, funnels, observing stations, bridges, platforms, davits, and a crowd of other things, which the first explosive shell would smash and scatter in ruins. The 12-in. turrets and the 4·7-in. battery might be invulnerable, but immense damage would be wrought at the ends, and the ship would become unmanageable. A new type of ship, it is contended, becomes necessary, which will be reduced still more in superstructure, aided thereto by internal combustion engines. He suggests, with diffidence, that a ship, heavily protected, armed with nine big guns in three turrets, and having a speed of 23 knots, could be designed with a displacement of 15,000 tons. "In any case," he concludes, "naval constructors must, more than ever, take account of high explosive destructive means as now developed; and if the influence of the torpedo was so great on the construction of warships, I see no reason why the bursting shell should not exert like influence, though in another manner."

Austria-Hungary.

Armour-plates.

Very little information is now allowed to transpire concerning recent progress in Austro-Hungarian armour or ordnance. Various statements, to which not much credit can be attached, have appeared in the press, and there is no reason to doubt that the nickel-tungsten steel is giving good results for armour-plates. The Société Anonyme John Cockerill, of Seraing, Belgium, has patented in Austria a plate of new character for the decapping of projectiles. The peculiarity is that the shot strikes a very hard surface which is designed to break its cap, and then, uncapped, encounters a second hard surface, the plate being built up of two laminations, and great resistance and endurance are attributed to it. But nothing is known as to the trials of the plate, nor whether it is being adopted in Austria. Austro-Hungarian armour comes mostly from the Wikowitz works in Moravia and the Poldihütte establishment near Prague.

It is not stated that the new "Dreadnoughts" will carry any heavier gun than the 12-in., but no doubt at the Skodawerke, Pilsen,

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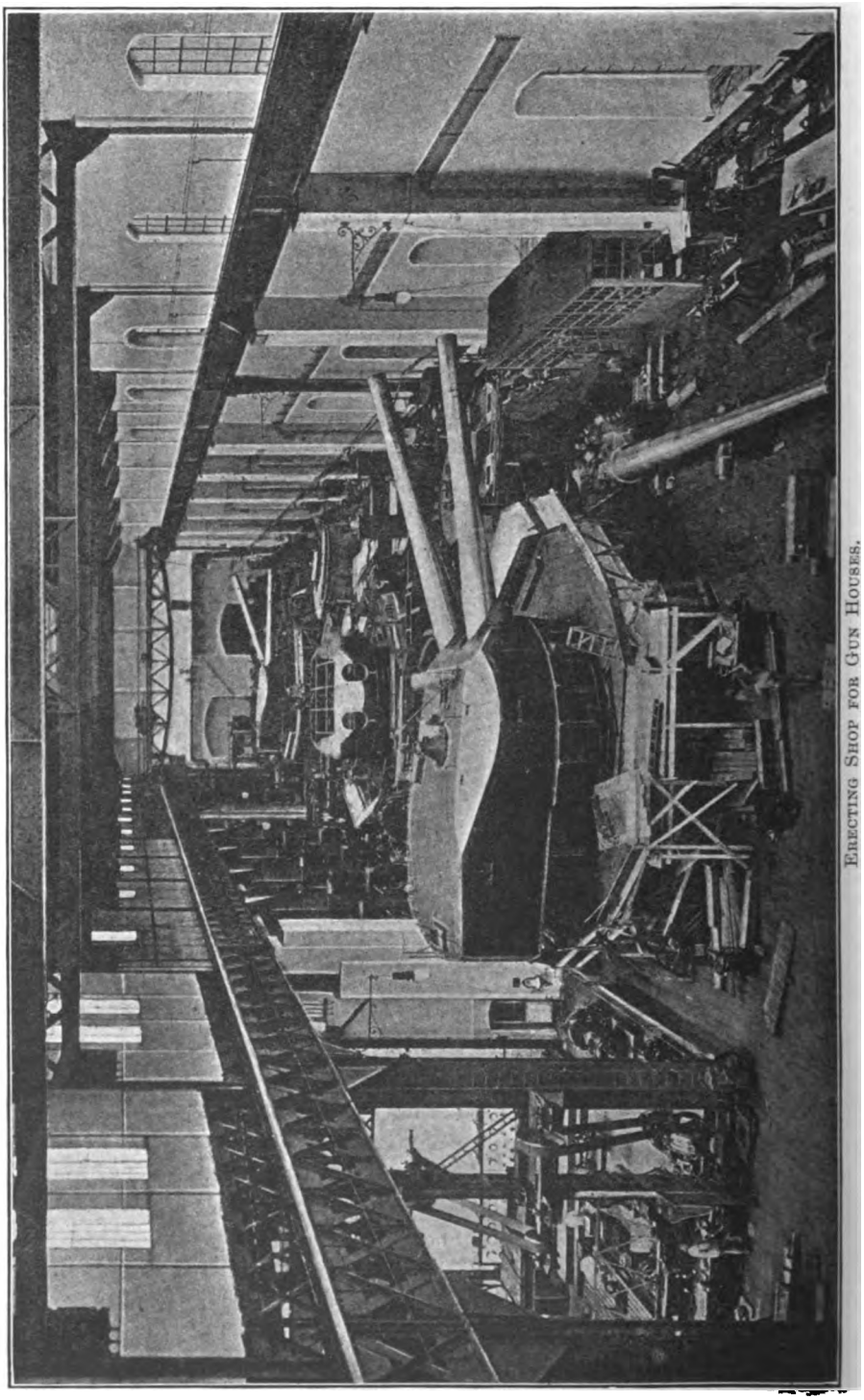

Erecting Shop for Gun Houses.
Skoda Works, Austria.

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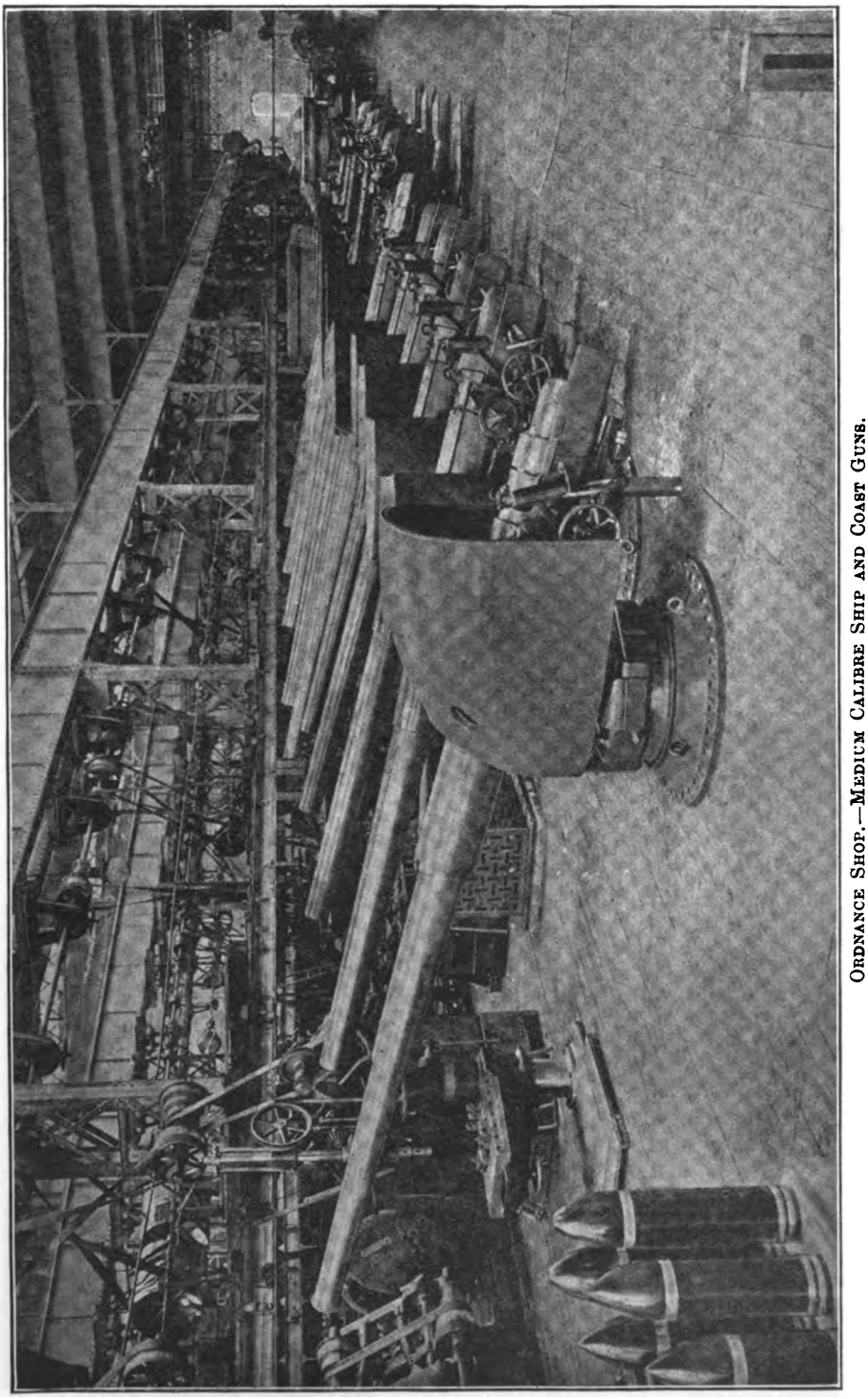

Ordnance Shop.—Medium Calibre Ship and Coast Guns.
Skoda Works, Austria.

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which is the arsenal of the Navy, a heavier gun has been designed to bring the new Fleet into line with the general advance towards a larger calibre. The 12-in. gun in three calibres is the largest appearing in the Skoda tables, and it is the gun of the Radetzkys in 45 calibres and the Erzherzog Franz Ferdinand in 50 calibres. The latter appears to be the gun of the first one-calibre gun ships also. The following are the weights and ballistic features of the three calibres, from details which we are authorised to say were correct in March.

	40 cal.	45 cal.	50 cal.
Length . . . . . ft.	40	45	50
Weight, including breech . . . tons	46·95	53·44	60·32
,, of projectile, light . . . lb.	771	771	771
,, ,, heavy . . . lb.	992	992	992
,, of charge . . . . . lb.	227	249	271
Muzzle velocity, light . . . . ft. secs.	2,789	2,969	3,149
,, ,, heavy . . . ft. secs.	2,461	2,635	2,789
Muzzle energy . . . . . ft. tons	41,655	47,436	53,302
Perforation of steel . . . . . ins.	33·8	37·1	40·3

Skoda Works.

The figures for muzzle energy and perforation—the latter at the muzzle—seem to apply to the heavy projectile. The Skodawerke at Pilsen, where these guns are built, have now developed into one of the largest armour and ordnance establishments in the world. They date from a machine factory established by Count Waldstein in 1859, which was taken over by Emil Ritter von Skoda ten years later. In 1886 the first trials of armour-plate began, and the machine gun of the Archduke Karl Salvator and Colonel von Dormus was taken in hand for manufacture. In 1893 the Skoda machine gun was first used in ships of the Imperial and Royal Navy and the artillery of the Army, and in 1895 the Skodawerke were the first armament manufacturers to introduce a field gun with long recoil. In the following year the works were greatly extended, and in 1897 the first 5·9-in. 40-calibre gun was delivered to the Navy. The steel plant was largely increased, and the machinery and boiler-works enlarged, and in 1899 the company was established with its present name, Ritter von Skoda being its chairman and director. The large erecting shop was then built, and when Ritter von Skoda died in 1900 he was succeeded by Gustav Ritter von Mauthner as chairman, and Herr Walter Trappen as director. A colliery was acquired at Brüx, the steel furnaces were extended, a firing ground was purchased at Bolewetz, near Pilsen, and in 1901 the first 9·4-in. 40-calibre naval gun was put upon trial. Changes took place in direction and management, and enormous extensions were made in all departments, especially in 1907, when

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new machine shops were built, the iron and steel plant was transferred to new buildings, the erecting shop was enlarged, making four large bays, stores were built, and new administrative offices were opened. In 1908 the first 45-calibre 12-in. gun was produced. Since that time, within two years, further great enlargements have taken place to cope with the demands of the new fleet. The smithery has been extended, the power station completed with a 5000 H.P. steam turbine, and the boiler shops enlarged, an experimental and laboratory branch instituted, other shops built, a new gun-shop erected, the steel plant extended, and institutions formed for the men, who now number about 6500, with nearly 600 officials. The works are employed in the manufacture of all kinds of guns, armour, ammunition, military carriages and many kinds of war material, and the production of ingot steel and metals for many purposes, large castings and forgings for shipbuilding and railway requirements, and bridge building, and boiler and engine work. The present general director and manager of the establishment is Karl Ritter von Skoda, son of the founder.

SWEDEN.

Torpedo gun.

It appears from the *Dagblad* of Stockholm that a new gun, the invention of Major Unge, has been tried at the Marma trial ground near Upsala. It is intended to discharge air "torpedoes"; but the new feature is that it is primarily designed as an armament for dirigibles. The trials included the discharge of ten of the "torpedoes," which were not found without defects. They resemble in some ways the Krupp projectile, and are fitted with smoke tracers. For use on the ground, with an elevation of 24 deg., the gun is said to have a range of 3600 yards, while elevated to 40 deg. the range is over 4900 yards. As the armament of a dirigible the gun hangs by two cables from 16 ft. to 33 ft. below the car. The cable attached to the breech has an electric connection for firing the gun, while the elevation is regulated by working the muzzle cable, and for loading the gun the latter brings it towards the vertical in such a way that the "torpedo" can be inserted through an aperture in the bottom of the car. The gun weighs only 70·5 lb., and the carriage for land use only 72·7 lb. The Swedish trials seem to have been of the ballistic qualities of the gun, and no definite particulars are given. It did not appear that the gun had been tried suspended from a dirigible.

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BRITISH RIFLED ORDNANCE.

Other guns are mounted, but details are withheld from publication.

Ordnance.										Charge (cordite).		Projectile.						Ballistics (with full charges).						
Nature.					Chamber.		Rifling. Twist one turn in.												Perforation of wrought iron.					Perforation Krupp steel, 3000 yards. Uncapped Shot.
Calibre or Pr.	Weight.	Mark and Service.*	Total length in inches.	Length of Bore, including Chamber.	Diameter (at largest).	Length to base of projectile.	Least at breech.	Greatest at muzzle.	System.†	Weight.	Size.	Diameter.	Weight.	Bursting Charge of Common Shell.	Value of $\frac{d^3}{w}$.	Value of $\frac{w}{d^2}$.	Muzzle velocity.	Total muzzle energy.	At muzzle.	At 1000 yards range.	At 2000 yards range.	At 3000 yards.	
R.L. GUNS.				cals.	ins.	ins.	cals.	cals.		lbs. oz.		ins.	lbs.	lbs. oz.			f. s.	ft. tons.	ins.	ins.	ins.	ins.	ins.
16·25-in.	110½ tons.	III.	524·0	30·0	21·125	84·5		30	Modified Pl. Section, the last in the new guns.	960‡ S.B.C.	..	16·25	1800	‡‡193 **179½	0·147	0·420	2087	54,390	38·0	34·6	31·7	29·4	13
13·5-in.	69 & 67 tons.	I. II. III.& IV.	433·0	30·0	18·0	66·5		30		187 8	..	13·5	1250	**85	0·146	0·508	2016	35,230	33·0	30·2	27·6	25·2	11
12-in.	46 tons.	VIII. Wire	445·5	35·43	16·0	70·0		30		167 8	50	12·0	850	80–1 9/11	0·169	0·492	2367	33,020	37·0	32·7	29·4	26·6	11½
12-in.	50 tons.	IX. Wire	496·5	40·0	17·5	87·2		..		201 8	50	12·0	850	,,	..	..	2481	36,290	39·7	35·4	31·6	28·7	12½
										9 8	33¾						§2580	39,280	42·0	38·0	34·6	32·0	14
12-in.	58 tons.	X. Wire	558·0	45·0	..	..		..		325 0 M.D.	..	12·0	850	..	..	..	2900	47,697	51·0	46·2	42·0	38·4	17
10-in.	31 tons.	Triumph & Swiftsure	483·0	45·0	14·0	64·5		..		..	..	10·0	500	..	..	..	§2800	$27,205	39·5	34·6	30·2	27·0	11¾
10-in.	29 tons.	II. III. III.A & IV.	342·4	32·0	14·0	54·0		30		76 0	30	10·0	500	37¾	0·200	0·500	2040	14,430	24·8	21·8	19·3	17·0	7½
9·2-in.	21 & 22 tons.	I. & II.	255·8	25·56	11·0	44·0		35		42 0	30	9·2	380	18	0·223	0·488	1781	8,356	18·3	15·9	14·4	12·4	5½
9·2-in.	24 & 22 tons.	III. V. VI. VI.A&C & VII.	310·0	31·5	12·0	43·0		30		53 8	30	9·2	380	‡‡33 **30 6/16	0·223	0·488	2065	10,910	22·9	19·8	17·2	15·5	6¾
9·2-in.	25 tons.	Wire VIII.	384·0	40·08	10·5	53·15		..		63 0	40	9·2	380	..	0·223	0·488	2347	14,520	27·6	23·9	20·7	18·0	7¾

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9·2-in.††	28 tons.	Wire X.	442·35	46·6	13·0	71·215	Various in the	..	P. Elswick, Hook, or	103	0	44	9·2	380	..	0·223	0·488	{2640 §2800	18,400 20,685	33·8 36·0	28·9 31·2	25·0 27·4	22·0 24·0	9½ 10½
7·5-in.	16 tons.	{Triumph & Swiftsure}	386·7	50·0	..	46		..		..	..	..	..	200	..	0·281	0·474	§2800	10,883	29·0	24·9	21·4	17·8	7¾
7·5-in.	14 tons.	..	337·5	45	11·1	55		30		{47 0 30 2 8 2½}			7·5	200	18½	0·281	0·474	2600	9,340	26·0	22·3	18·8	15·7	6¾
6-in.	5 tons.	III.	170·7	25·53	8·0	26·75		35					6·0											
6-in.	5 tons.	{IV. VI.}	173·5	26·0	8·0	26·75		35 30		14	12	20	6·0	100	{7 4/16 **9 13/16}	0·360	0·463	1960	2,665	13·4	10·7	8·9	7·0	3
6-in.	7·4 tons.	{VII. VIII.}	269·5	45	8·5	32·7		30		20	0	20	6·0	100	9	0·360	0·463	{2493 §2750	4,308 5,250	19·6 22·3	15·3 18·0	11·9 14·6	9·8 11·6	4¼ 5
4-in.	{23 cwt. 26 cwt.}	II.II, III.III, IV.V.& VI.	120·0	27·0	5·3	18·5	120	30		3	1	5	4·0	25	{1 1/16 3 3/16}	0·640	0·391	1900	625	7·7	5·4	4·0	3·0	..

* The Roman numeral is the number of the pattern given. Further differences in pattern are indicated by letters a, b, and c. Some details of the 12-in. Mark X. uncertain.
† P. means Polygroove; Pl., Plain; ‡ Cordite has not been introduced for this gun; § Estimated with M.D. cordite;
** Cast steel; †† ▲ 50-calibre 9·2-in. gun is under construction; ‡‡ Forged steel.

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BRITISH RIFLED ORDNANCE—*continued.*

Ordnance.										Charge. (full).	Charge (cordite).		Projectile.						Ballistics (with full charges).					
Nature.					Chamber.		Rifling.														Perforation of wrought iron.			
Calibre or Pr.	Weight.	Mark and Service.	Total length in inches.	Length of Bore, including Chamber.	Diameter.	Length to base of projectile.	Twist one turn in: Least at breech.	Twist one turn in: Greatest at muzzle.	System.*	Weight.	Weight.	Size.	Diameter.	Weight.	Bursting Charge of Common Shell.	Value of $\frac{d^3}{w}$.	Value of $\frac{w}{d^2}$.	Muzzle velocity.	Total muzzle energy.	Muzzle energy per ton of gun.	At muzzle.	At 1000 yards range.	At 2000 yards range.	At 3000 yards range.
QUICK-FIRING GUNS (using metal cases)				cals.	ins.	ins.	cals.	cals.		lbs.	lbs. ozs.		ins.	lbs.	lbs.			f. s.	ft. tons.	ft. tons.	ins.	ins.	ins.	ins.
6·0 in.	7 tons	I. & III. / II. (Wire)	249·25	40	..	..	60	30	P.	..	13 4	30	6·0	100·0	..	0·360	0·463	2200	3356	479	15·9	12·7	10·2	8·2
6·0 in. Q.F.C.	5 „	I. to VI.	169·1	26·2	..	..	..	..										1913	2537	362	13·0	10·3	8·2	6·4
			166·6	26·6	..	..	..	..																
4·7 in.	41 cwt. / 42 „	I. II. III. & IV. Wire	194·1	40	..	..	100 / 0	34·4 / 30	E.O.C.	..	5 7	20	4·72	45·0	..	0·495	0·428	2188	1494	711	12·4	9·2	6·6	5·0
4 in.	26 cwt.	I. II. III. Wire converted guns	165·25 / 120	40 / 28	..	..	..	30	M.Pl.	..	3 9	15	..	25·0	..	0·640	0·390	2300 / 2177	917 / 821	705 / 569	10·5 / 9·5	6·9 / 6·5	4·9 / 4·6	3·3 / 3·0
12-pr.	12 cwt.	I.	123·6	40	..	..	120 / 0	28 / 30	E.O.C. / M.Pl.	..	1 15	10	3·0	12·5	..	0·072	0·463	2210	423	677	8·1	5·3	3·5	2·4
12-pr.	8 cwt.	I.	87·6	28	..	..	60 / 0	28 / 30	E.O.C. / M.Pl.	..	13 3/4	10	3·0	12·5	..	0·072	0·463	1607	223·8	544	4·9	3·2	2·4	..
Hotchkiss . 6-pr...	8 cwt	I. & II.	97·63	40·0	..	..	180	29·9	M.Pl.	..	b7 3/4	5	2·24	6·0	..	0·836	0·534	1818	137·5	344·8	4·8	2·8	..	..
Nordenfelt . 6-pr...	6 cwt.	I. II. & III.	104·4	42·3	..	..																		
Hotchkiss . 3-pr...	5 cwt.	I. & II.	80·63	40	..	..	25	25	M.Pl.	..	b6 3/8	5	1·85	3·3	..	1·037	0·521	1873	80·3	321·2	4·1	2·1	..	..
Nordenfelt . 3-pr...	4 cwt.	I. L.	91·5	45·4									..	..	..	..	..	1920	84·3	337·2	4·3	2·2	..	..
MACHINE GUNS.										grains.				grs.										
Maxim, 1 bar 0·45 in.	63 lbs.	I.	45·0	..	..	..	10	27	Enfi'ld	31 Cordite	..	..	0·450	480	..	2·952	0·751	..	..	..	Same as M.H. Rifle.			
Maxim, ·303			42·38				10	25·6	Metf'd				0·303	215	..	..	..	..	..	..	Same as Lee-Metford.			

* P. means Polygroove; M.Pl., Modified plain.

b With 4 grs. R.F.G.

Note.—An armour-piercing shell has now come in for the 6-in. guns.

AUSTRIAN NAVAL ORDNANCE.

Designation by Calibre, in centimètres, length in calibres, and type of gun	30·5 L. 45 Skoda.	24 L. 45 Skoda.	24 L. 40 Skoda.	24 L. 40 K. 01	24 L. 40 K. 94	19 L. 42 Skoda.	15 L. 40 Skoda.	15 L. 40 Krupp	15 L. 35 K. 80	12 L. 40 Skoda.	12 L. 35 K. 87
Calibre, in inches	12·01	9·45	9·45	9·45	9·45	7·5	5·91	5·9	5·87	4·72	4·72
Length: Total, in feet	45·0	33·0	31·5	31·6	31·4	26·3	19·5	19·5	17·13	15·74	13·8
Length: Rifled Portion, in ins.	417·9	325·8	290·3	291·3	286·2	239·7	182·6	182·5	153·6	147·6	126·3
Length: Powder Chamber in ins.	68·3	58·1	55·5	59·0	63·7	51·8	35·4	35·4	35·4	28·3	26·3
Length: Of bore in calibres	45	45	40	40	40	42	40	40	35	40	35
No. of Grooves	92	72	72	72	72	56	44	44	36	36	36
Twist in calibres	40–25	40–25	45–25	..	..	..	..	..	25	25	25
Weight: Gun, tons	51–9	25·78	27·55	21·5	27·8	11·6	5·18	4·42	4·69	1·97	2·31
Weight: Breech Block, in lbs.	3450·2	1873·9	1336·0	..	..	..	..	339·5	463·0	..	211·6
Weight: Steel Shell „	992	473·0	504·8	474	474	198	112·5	100·3	86·0	52·4	57·3
Weight: Common Shell „	..	..	..	474	474	..	112·5	..	69·9	52·4	57·3
Weight: Shrapnel Shell „	..	..	..	..	..	..	..	..	71·9	..	57·3
Weight: Case Shot „	..	..	..	..	..	..	..	..	..	..	..
Weight of Bursting Charge: Steel Shell „	..	..	4·5	..	..	..	..	1·98	1·76	..	0·55
Weight of Bursting Charge: Common Shell „	.	..	35·4	..	..	..	..	5·73	3·86	..	2·2
Weight of Bursting Charge: Shrapnel Shell „	..	..	..	..	..	..	..	0·96	1·10	..	0·57
Weight of Firing Charge: Steel Projectile, in lbs.	..	147·7	99·2	120·6	91·5	56	28·8	18·29	38·8	9·7	12·13
Weight of Firing Charge: Common Shell, in lbs.	..	..	66·1		91·5			..	38·8	..	12·13
Weight of Firing Charge: Shrapnel, in lbs.	..	..	..	..	..	..	..	..	..	..	..
Muzzle Velocity, in feet	2625	2625	2313	2595	2264	2700	2608	2263	1969	2264	2133
Muzzle Energy: Total, foot-tons	47,402	18,799	18,244	22,121	16,845	10,025	5308	3351	2312	3554	1808
Muzzle Energy: Per inch circumference, foot-tons	..	..	..	..	..	..	..	..	125·4	..	122·2
Thickness of Iron, perforated inches at Muzzle, by Tresidder's formula	..	..	...	34·5	29·0	27·3	22·0	..	12·6	13·7	12·9
Perforation of Krupp Steel, 3000 yds., inches	..	..	..	9½	8	6¾	5	..	..	..	..

There are other types of Krupp guns, also Skoda 7-cm., Skoda and Hotchkiss 47-mm., and Hotchkiss 37-mm.

Corrected to March, 1911.

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DANISH NAVAL ORDNANCE.

Designation by Calibre, in centimètres, length in calibres, and type of gun	26 L. 35 Krupp	24 L. 40 1893 Krupp.	24 L. 40 1896 Canet.	24 L. 43 1901 Bofors.	24 L. 43 1906 Bofors.	21 L. 35 Krupp.	15 L. 35 1888 Krupp.	15 L. 43 1896 Bofors.	15 L. 43 1901 Bofors.	15 L. 50 Bofors.	12 L. 40 Krupp.	8·7 L. 40 Krupp.	7·5 L. 55 Danish semi-aut.	5·7 L. 44 Hotchkiss.	4·7 L. 44. Hotchkiss.	4·7 L. 50 Danish semi-aut.
Calibre, in inches	10·24	9·45	9·45	9·45	9·45	8·24	5·87	5·87	5·87	5·87	4·72	3·43	2·95	2·24	1·85	1·85
Total length, in feet	29·86	31·50	31·50	33·86	33·86	24·05	17·12	21·17	21·17	24·46	15·75	11·41	13·53	8·13	6·72	7·71
Length of Bore, including Powder Chamber — in inches	327·6	349·7	358·5	397·0	397·0	264·5	189·0	244·0	247·4	286·4	176·4	126·8	152·6	89·8	74·1	87·6
Length of Bore, including Powder Chamber — in calibres	32·0	37·0	37·9	42·0	42·0	32·1	32·2	41·6	42·1	48·8	37·3	37·0	51·7	40·0	40·0	47·3
Number of Grooves	60	72	60	60	60	48	36	44	44	44	36	32	28	24	20	20
Twist of Rifling, in calibres	70–25	00–25	72–33	72–33	33	50-25	70–25	70–30	70–30	30	42–25	45–20	30	180–30	25	40–25
Total weight, including Breech-gear, tons	27·3	25·4	22·9	24·3	24·5	13·3	4·7	5·5	5·5	7·5	2·26	1·13	0·87	0·36	0·23	0·32
Weight of — Breech Block, tons	2006	1691	871	851	802	904	390	295	252	313	205	136	83	60	40	40
Weight of — Armour-piercing Projectile, lbs.	452	353	353	353	353	238	112	112	112	112	..	..	..	..	..	..
Weight of — „ Shell „	..	353	353	353	353	..	..	112	112	112	44	20	15	6	3·3	3·3
Weight of — Common Shell, lbs.	452	353	353	353	353	238	112	112	112	112	44	20	15	6	3·3	3·3
Weight of Bursting Charge — Armour-piercing Shell, lbs.	..	5·3	5·3	5·3	5·3	..	..	1·7	1·7	1·7	1·7	0·7	0·7	0·25	0·11	0·11
Weight of Bursting Charge — Common Shell, lbs.	29·8	24·9	24·9	21·4	21·4	16·5	7·2	7·2	7·2	7·2	2·8	1·3	0·7	0·19	0·14	0·14
Weight of Firing Charge, lbs.	191·8	91·5	77·2	83·8	97·0	105·8	41·9	22·0	22·5	34·2	11·3	4·7	4·0	1·3	1·1	1·4
Muzzle Velocity, feet	2018	2362	2362	2477	2641	2018	1854	2297	2297	2690	2362	2362	2625	2297	2346	2723
Muzzle Energy — Total foot-tons	12750	13640	13640	15000	17060	6712	2678	4100	4100	5642	1702	767	737	218	126	170
Muzzle Energy — Per inch circumference, foot-tons	396·4	459·5	459·5	505·4	574·7	259·3	145·2	222·4	222·4	306·1	114·8	71·2	79·5	31·0	21·7	29·3
Perforation at Muzzle, wrought iron, Tresidder's formula, inches	22·8	26·6	26·6	28·6	31·5	18·5	13·2	18·3	18·3	23·2	13·3	10·5	11·7	6·8	5·8	7·2
Perforation Krupp Steel, 3000 yards, inches	6·2	9·1	9·1	9·8	10·7	4·2	3·3	6·2	6·2	7·9	..	..	..	..	..	..

There are also some older 1·46-inch, 1-pr. Hotchkiss guns.

Corrected to February, 1910.

DUTCH NAVAL ORDNANCE.

	Krupp Breech Loading Q.F.											
Designation by Calibre, in centimètres	28 Q.F.	28	28	24 Q.F.	24 Q.F.	21	21	15 Q.F.	15 Q.F.	15 Q.F.	15 Q.F.	12 Q.F.
Calibre, in inches	11·0	11·0	11·0	9·4	9·4	8·2	8·2	5·9	5·9	5·9	5·9	4·72
Total Length, in feet	40·0	20·0	27·56	31·5	31·5	24·06	24·06	17·12	19·55	19·55	19·55	15·75
Length of Rifled Portion of Bore, in inches	..	170·34	244·55	..	..	222·75	212·32	..	..	..	..	..
Length of Powder Chamber „	..	35·43	42·71	..	..	30·90	41·34	..	..	..	..	..
Length of Bore, in Calibres	40	18·79	27·00	37	37	32·11	32·11	32	37	37	37	37
Number of Grooves	..	64	64	..	..	48	64	..	..	..	..	..
Depth of Grooves, inches	..	0·04	0·04	..	..	0·4	0·4	..	..	..	..	..
Twist of Rifling, in Calibres	..	45	70-25	..	..	45–25	45–25	..	..	..	..	2·35
Total Weight, in tons	29·53	27·2	27·06	24·1	24·39	13·28	13·96	3·83	4·33	4·78	5·11	..
Firing Charge — Armour-piercing Projectile, in lbs.	..	132·3	185·2	..	..	94·8	119	..	..	..	..	..
Firing Charge — Common Shell „			154·3									
Weight — Armour-piercing Projectile „	595·24	537·76	760·60	374·80	374·80	308·64	308·64	100	100	90·38	90·38	52·35
Weight — Common Shell „		476·18	476·18									
Weight — Case Shot „		..	..									
Bursting Charge — Armour-piercing Projectile „	..	..	..	..	..	..	..	..	..	..	..	..
Bursting Charge — Common Shell „												
Muzzle Velocity, feet	2920	1558·5	1591	2690·5	2789	1798	1903	2133	2221	2444	2789	2221
		1673	1706									
Muzzle Energy — Total, in foot-tons	15,191	9425	13,345	18,809	20,210	6920	7750	3169	3469	3744	4874	1807
Muzzle Energy — Per inch Circumference, foot-tons	..	..	..	..	..	..	..	..	..	..	..	..
Perforation at Muzzle, in inches (Krupp Steel)	24·25	..	11	18·1	19·1	8·25	9	6·1	6·5	9·8	11·5	4·7
Perforation Krupp Steel, 3000 yards	18·50	..	8·25	14	14·2	5·7	6·3	3·5	3·9	5·7	7·1	..

Corrected to February, 1910.

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FRENCH NAVAL ORDNANCE.

Date and Pattern of Gun.	Model 1902.	Model 1893–96.				Model 1893.					Model 1887.				1884.					1881.						
Desig. by Calibre, in cms.	30·5	30·5	27·44	24·0	19·4	34·0*	30·5	27·44	24·0	19·4	34	30·5	27	19	34	27	24	16	14	34 long.	34 short.	27	24	16 heavy.	16 light.	14
Calibre, in inches	12·01	12·01	10·8	9·45	7·64	13·39	12·0	10·8	9·45	7·64	13·39	12·0	10·80	7·64	13·39	10·80	9·45	6·49	5·45	13·39	13·39	10·8	9·45	6·49	6·49	5·46
Total length, in feet	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	28·47	24·89	17·04	..	33·69	25·32	27·12	23·70	15·14	15·14	14·3
Length of Bore, in ins.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	380·6	280·2	306·9	269·3	180·9	180·9	162·6
Length of Bore, in cals.	45	40	40	45	45	35	40	40	40	40	42	45	45	45	30	30	30	30	30	28·5	21·0	28·5	28·5	28	28	28
Number of Grooves	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	50	50	42
Depth of Grooves, inches	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0·067	0·067	0·059	0·055	0·039	0·039	0·035
Rifling Twist	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	7°	7°	7°	7°	7°	7°	7°
Total weight, in tons	..	44·4	34·5	23·6	12·5	52·9	45·9	34·9	22·4	10·6	60·0	49·2	37·1	10·6	50·8	27·7	17·9	5·4	3·15	52·2	47·2	27·4	17·7	4·9	3·9	3·2
Weight of Firing Charge — Armour-piercing Projectile, lbs.	..	246	188·5	145½	74	243·0	198·4	114·6	110·2	44·1	220·5	198·4	114·6	44·1	388·0	200·6	..	42·5	..	388·0	337·3	203·9	149·9	42·5	32·6	..
Weight of Firing Charge — Com. Shell lbs.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	200·6	..	42·5	27·1	337·3	368·2	203·9	149·9	42·5	32·6	27·1
Weight — Armour-piercing Projectile lbs.	750	750	562	375	190	925·9	643·8	476·2	317·5	165·3	925·9	643·8	476·2	165·3	925·9	476·2	317·5	99·2	..	925·9	925·9	476·2	317·5	99·2	99·2	..
Weight — Com. Shell „	..	750	562	375	190	925·9	643·8	476·2	317·5	165·3	925·9	643·8	476·2	165·3	771·6	396·8	264·6	99·2	66·1	771·6	771·6	396·8	264·6	99·2	99·2	66·1
Muzzle Velocity, in f.-s., A.P. Projectile	2870	2650	2650	2870	2870	2400	2625	2625	2625	2625	2560	2625	2625	2625	1969	1969	1969	1969	1969	1969	1804	1969	1969	1969	1821	1936
Muzzle Energy — Total, in f.-t.	42890	36782	27186	21445	10890	36850	30750	22750	15170	7898	42040	30750	22750	7898	24900	12800	8539	2668	1777	24900	20880	12800	8539	2668	2080	..
Muzzle Energy — Per in. circ., f.-t.	..	..	..	..	..	..	815·8	670·7	511·1	329·1	..	815·8	670·7	329·1	591·9	377·5	287·7	130·8	103·9	591·9	496·6	377·5	287·7	130·9	121·3	..
Perforation at Muzzle† wrought iron, inches.	46·0	42·7	38·8	37·0	29·0	36·8	37·3	33·7	29·4	23·4	40·8	37·3	33·7	23·4	27·6	22·0	19·2	13·0	10·7	27·6	24·2	22·0	19·2	13·0	11·6	..
Perforation Krupp Steel 3,000 yds.	15½	13⅓	11½	10⅓	6¾	11½	11	9	7½	5½	13	11	9	5½	7½	6	5¼	3	..	7½	7	6	5¼	3	..	..

* For special purposes.

† By Tresidder's formula.

A new type of the 1902 Model has been tried with 7·6-in. and 6·4-in. calibre. These will probably be replaced by model of 1906, 12-in. 970 lb. projectile, velocity 2840 f.-s., and 9·4-in. 220 lb. projectile, velocity 2840 f.-s.

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FRENCH NAVAL ORDNANCE—*continued.*

Date and Pattern of Gun.	16·47.*	Q.F. Guns.							
		Mod. 93-6. 16·47	16§	16‡	14§	14‡	Mod. 92. 10	Mod. 91. 10	Mod. 81. 10‡
Desig. by Calibre, in cms.	16·47		16·47		13·86			10·00	
Calibre, in inches	6·46		6·46		5·44			3·94	
Total length, in feet	26·9								
Length of Bore, in inches	..								
Length of Bore, in calibres	47·5	45	45	30	45	30	55	45	26
Number of Grooves	..								
Depth of Grooves, inches	..								
Rifling Twist	..								
Total weight, in tons	8·5	8·1	6·89	4·92	4·13	3·84	2·19	1·62	1·18
Weight of Firing Charge — Armour-piercing Projectile lbs.	..	44	30·2	19·0	16·1	12·8	8·16	8·16	5·07
Weight of Firing Charge — Common Shell „	..								
Weight — Armour-piercing Projectile lbs.	115	115	99·21		66·14			30·87	
Weight — Common Shell „	..	115	99·21		66·14			30·87	
Muzzle Velocity, in ft.-secs.	3110	2870	§2625	2100	2625	2100	2500	2428	1840
Muzzle Energy — Total, in foot-tons	7185	6568	4730	3061	3160	2022	1340	1266	725
Muzzle Energy — Per in. circ. foot-tons	..	..	233·5	150·9	184·9	118·7	..	..	..
Perforation at Muzzle, wrought iron, inches	26·3	24·5†	20·0†	14·4†	17·7†	12·7†	13·0†	12·5†	8·2†
Perforation Krupp steel, 3,000 yards	5⅜	5¼	4	..	..	..	..	..	..

* Experimental gun not in service. † By Tresidder's formula. ‡ Models 1881 and 1884 converted guns.
§ There are three models of the years 1887, 1891 and 1893, of slightly different weights from the above.

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ITALIAN NAVAL ORDNANCE.

	Armstrong Breech Loading.					Q.F.	Armstrong B.L.	Armstrong Quick-Firing.					
Designation by Calibre, in centimètres .	43·1†	43·1† Early Pattern. 1882.	34·3	30·5	25·4	20·3	15·2	15·2	15·2	15·2	12·0	12·0	7·6
Calibre, in inches	17	17	13·5	12	10	8	6	6	6	6	4·7	4·7	3·0
Length — Total, in feet . . .	40·75	39	36·09	..	34·8	..	16·9	17·0	20·9	20·9	16·2	13·0	..
Length — Rifled Bore, in inches .	346·8	315·7	..	..	..	..	..	..	..	..	189	..	..
Length — Powder Chamber, in inches .	84·5	98	..	..	..	..	..	..	..	..		..	..
Length — Bore, in Calibres . . .	27	26	..	40	40	45	32	33·0	40	40	40	35	40
No. of Grooves . . .	32	32	56	..	..	..	..	..	..	..	22	22	..
Twist of Rifling, in Calibres . .	50	50	..	..	..	..	..	..	..	..	34·4	..	..
Total Weight, in tons	104·3	101·5	67·9	..	30	..	5·4	5·1	5·7	6·5	2·05	1·69	0·6
Firing Charge — Armour-piercing projectile, lbs.	900·0	725	630·5	..	..	..	46	46	46	17·6*	..	..	..
Firing Charge — Common Shell, . „	600	480	..	..	..	..	..	.	..	..	..	..	..
Weight — Armour-piercing projectile, „	2000	2000	1250	850	448	250	98	98	100	100	45·0	36·0	12
Weight — Common Shell, . . „	2000	2000	1250	..	..	..	..	..	..	..	..	36·2	..
Weight — Shrapnel „ . . . „	2017	2017	1250	..	..	..	..	..	..	..	..	29·8	..
Weight — Case Shot . . . „	..	.	..	..	..	..	..	..	..	..	..	..	..
Bursting Charge — Armour-piercing projectile, ..	32	32	17·4	..	..	..	2·0	2·0	5·1	4·4	..	1·88	..
Bursting Charge — Common Shell, ...	60	60	87·1	.	..	..	..	..	..	..	..	3·02	..
Bursting Charge — Shrapnel „	5	5	4·25	..	..	..	..	..	..	..	..	0·35	..
Muzzle Velocity, in ft.-secs. . .	1992	1935	2016	2500	2460	2600	1952	1985	2149	2297	2180	..	2625
Muzzle Energy — Total, foot-tons . .	55,030	51,930	35,230	36,925	18,798	11,730	2577	2705	3169	3622	1490	..	578
Muzzle Energy — Per inch circumference, foot-tons	1035	976·3	830·8	..	..	..	..	..	..	..	..	..	..
Perforation at Muzzle, inches of iron by Treaidder's formula . . .	36·7	35·0	33·0	40·0	31·0	28·2	13·2	13·6	15·4	17·0	12·4	..	10·2
Perforation Krupp Steel, 3000 yds., inches	12½	12	11	13	9	7	..	..	..	3½	..	..	..

* Ballistite. † There are four types of these guns, viz.—Lauria, Lepanto, Italia, Morosini.

Note.—There is also a 6-inch quick-firing gun, 40 cals. M.V., 2600 f.s.

The weight of Ballistite charges is not known, but it is understood that they give the same ballistics as the powder charges shown.

Corrected to April, 1910.

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NAVAL ORDNANCE OF NORWAY.

	Modern Guns.							
Designation by Calibre, in cms.	21	21 Q.F.	15	15 Q.F.	12 Q.F.	76 mm.	76 mm.	7 cm.
Calibre, inches	8·24	8·24	5·87	5·87	4·7	3·0	3·0	2·8
Total Length, feet	24·0	31·2	19·6	23·3	17·7	10·3	13·3	9·2
Length — Rifled Portion of Bore, inches	212·3	309·7	178·0	234·1	179·2	102·4	127·7	81·8
Length — Chamber, inches	49·0	48·6	39·0	32·9	26 0	15·4	20·4	19·1
Length — Bore in calibres	35·0	43·8	37·2	45 8	44·0	40	50	36·6
Number of Grooves	64	32	44	28	26	16	28	28
Twist of Rifling	46–23	∝–30	45–25	∝–30	∝–30	∝–30	30	20
Total Weight, tons	14·2	18·9	5·6	7·1	2·7	0·6	1·0	0·63
Weight of — Armour-piercing Shell, in lbs.	309	309	112·4	99·3	45	12·5	12·5	10·5
Weight of — Common Shell, in lbs.	..	..	..	..	..	..	..	..
Weight of * Firing Charge — Armour-piercing Shell, in lbs.	45·6	54	20·4	20·9	9·4	2·2	3·75	2·2
Weight of * Firing Charge — Common Shell, in lbs.	..	..	..	..	..	..	..	..
Muzzle Velocity, feet	1903	2300	2050	2625	2570	2200	2840	2230
Muzzle Energy, Total foot-tons	7760	11450	3328	4870	2060	430	695	367
Perforation through Iron by Tresidder's formula	19·3	25·6	15·4	21	15·3	8·0	11·6	7·8
Perforation, Krupp Steel, 3000 yards	4¾	6½	3½	4	..	..	..	..

* Smokeless powder.

Corrected to February, 1910.

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RUSSIAN NAVAL ORDNANCE.

	Heavy Guns.			Q.F. Guns.		
Calibre, in inches	12	10	8	6	4·7	12-pdr.
Weight, in tons	59	32	..	..	..	..
Length, in calibres	40	45	45	45	45	50
Weight of Projectile, in lbs.	720	488	188	89	46	12
Muzzle Velocity, foot-seconds	2600	2550	2950	2600	2700	2700
Perforation, in inches, of Wrought Iron — At Muzzle	38	35	27	22½	15½	10·2
Perforation, in inches, of Wrought Iron — At 2000 yards	30	27	20	13	9	4·8
Perforation of Krupp Steel at 3000 yards	12	10½	6½	4¾	..	..

There exists a new pattern 12-in. gun of 50 calibres, but details are not published.

Corrected to February, 1910.

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SPANISH NAVAL ORDNANCE.

	Hontoria.—Pattern 83.—Breech Loading.						Canet.		Skoda.			Krupp.	Vickers.		Maxim Nord.-felt.	Nordenfelt.		Sar-miento (?)	Hotchkiss.			Maxim Nord.-felt.
Designation by Calibre, in m/m	320	280	240	200	140	120	150	140	150	70	47	105	101·6	75	75	57	42	42	57	37	37	37
Length — Total length, in m/m	11780	10310	10200	7360	5303	4420	7500	6300	5960	2743	2018	3680	5240	1222·9	3500	2651	1935	1946	2480	842	1134	1105
Length — Powder Chamber, in m/m	2113·5	1845	1698·3	1695	1030	886	1124	1078·5	915	..	397·05	750	635·23	111	632·20	345·78	353	525·6	256	129	627	394·6
Length — Bore, in m/m	11180	9787	8387	7095	4879	4173	7250	4893·2	5540	2550	1881	3375	5100	934·74	3200	2413	1750	1806	2280	713	740	980·9
No. of Grooves	80	70	60	50	34	30	48	36	44	24	20	32	32	32	30	24	18	20	24	12	12	12
Depth of Grooves, in m/m	1·5	1·5	1·25	1·25	1·00	1·00	1·00	1·00	1·5	0·75	1·20	1·25	1·00	0·75	0·58	0·305	0·305	0·3	0·30	0·37	0·4	0·4
Twist of Rifling, in m/m and degrees	9600	8400	7200	6000	4200	3600	6°	4902·5	..	..	..	..	3048	1919·02	2250	1710	6°	1260	6°	1·107	1·131	1·110
Weight of the empty projectile — Armour-piercing proj., in kgs	472·20	315·0	198·0	114·6	39190	24100	39500	39190	44350	3878	1440	..	13920	5670	6410	2605	1093	1093	2546	0·488	0·488	0·409
Weight of the empty projectile — Common Shell, in kgs.	398·60	265·60	167·00	98·00	34946	21400	38·00	34946	40445	3770	1440	17400	12620	5600	6390	2633	1108	1108	2574	0·407	0·407	0·409
Weight of the empty projectile — Ring Segment, in kgs.	402·30	268 00	168·50	99·00	33835	21600	..	33835	44900	3760	..	..	..	..	..	..	..	..	..	..	..	..
Weight of the empty projectile — Semi-piercing, in kgs.	399·86	363·109	167·00	98207	34260	20043	..	34260	..	..	..	..	12920	..	..	..	..	..	..	..	..	..
Weight of the empty projectile — Case Shot, in kgs.	..	..	..	..	..	..	..	..	..	..	..	..	..	6000	..	2224	1264	1264	2240	0·616	0·616	..
Weight of the explosive charge. — For the Armour-piercing, in kgs	7500	5000	3000	1900	0·512	0·340	0·500	0·512	0·860	0·122	0·060	..	0·500	0·230	0·227	0·078	0·038	0·038	0·115	0·015	0·015	0·013
Weight of the explosive charge. — „ Common Shell, in kgs	21000	14000	9000	5000	1695	0·950	1430	1695	4225	0·230	0·060	0·350	1350	0·260	0·250	0·065	0·038	0·038	0·085	0·022	0·022	0·013
Weight of the explosive charge. — „ Ring Segment, in kgs.	17500	12000	7500	4000	1216	0·890	..	1216	0·445	0·240	..	..	..	..	..	..	..	..	..	..	..	..
Weight of the explosive charge. — „ Semi-piercing, in kgs.	..	..	..	..	..	..	..	..	..	..	..	..	1061	..	..	..	..	..	..	..	..	..
Muzzle Velocity, in metres	620	620	647 1	620	580	612	800	736	690	710	710	600	884	300	641	570	603	590	670	404	404	549
Muzzle Energy, in metre-tons	9408	6275·9	4400	2290	679·8	469	1309	1094·7	1098	102·9	38·5	326	574·9	27	139·1	45	21·6	20·2	42·5	4	4	6·4

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NAVAL ORDNANCE OF SWEDEN.

N. = belongs to the Navy {C.A. = belongs to the Coast Artillery.}	Armstrong.	Canet.	Canet and Bofors.	Armstrong.	Whitworth.	Bofors.		Bofors.			Bofors and Finspong.	Bofors.	Stockholms Vapenfabrik and Finspong.			Bofors.	Finspong.	Stockholms Vapenfabrik.		Finspong.	Stockholms Vapenfabrik.		
	25 cm.k. m/85	25 cm.k. m/89	25 cm.k. m/94	25 cm.k. m/94 B.C.	24 cm.k. m/90	24 cm.k. m/92	24 cm.k. m/96	24 cm.k. m/04	21 cm.k. m/98	15 cm.k. m/98	15 cm.k. m/03	12 cm.k. m/94 oc.k. m/97	12 cm.k. m/03	7·5 cm.k. m/05	5·7 cm.k. m/89	5·7 cm.k. m/89 B oc.k. m/99	5·7 cm.k. m/92	5·7 cm.k. m/95 ⊙ B1/95B	5·7 cm.k. m/95 C.	5·7 cm.k. m/95 D.	4·7 cm.k. m/92	4·7 cm.k. m/95	3·7 cm.k. m/98	3·7 cm.k. m/98 B
	C.A.	C.A.	N.	N.	C.A.	C.A.	C.A.	C.A.	N.	N.C.A.	N.C.A.	N.C.A.	C.A.	N.	N.	N.C.A.	N.C.A.	C.A.	C.A.	N.	C.A.	N.	N.	N.C.A.
Designation by Calibre, in cms.	25·4	25·4	25·4	25·4	24	24	24	24	21	15·24	15·24	12	12	7·5	5·7	5·7	5·7	5·7	5·7	5·7	4·7	4·7	3·7	3·7
Total Length . . . mm.	8636	8636	10670	10670	8237	8544	10320	12000	9335	6768	7620	5400	6000	3970	2737	3108	2760	1478	1504	1900	1200	2572	1368	1450
Length — Rifled Portion of Bore, mm.	6637	6550	8498	8498	6353	6618	8541	10009·3	7801·1	5693	6265·9	4665	5013	3129	2146	2517·5	2328	1049·5	1049·5	1448	817·0	2034·5	1126	1126
Length — Chamber . . .	1397	1397	1669	1669	1209	1373·1	1299·6	1508·4	1123	787·7	1049·9	474	742	560·5	265	265	229	205	262	262	175	2574	208	133·4
Length — Bore, in calibres .	32	32	40·5	40·5	32·4	33·5	41	48	42·5	42·5	48	43	48	49	·12	49	·15	22	23	30	22	49	34	34
Number of Grooves . . .	42	A. 42	B. 40	44	44	42	40	40	60	44	44	36	36	28	24	24	24	24	24	24	24	20	16	16
Twist of Rifling . . .	40	40	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	25	25	27	25	30	30	30
Total Weight . . . tons	30·25	31·03	28·16	29·2	23·84	28·1	25	30·44	19·49	5·92	7·75	2·8	3·7	0·975	0·340	0·380	0·334	(0·216) (0·206)	0·212	0·189	0·116	0·243	0·0675	0·0751
Weight — Armour-piercing Shell in kg.	204	204	204	204	181	215	215	215	125	45·4	45·4	21	21	—	—	—	—	—	—	—	—	—	—	—
Weight — Common Shell . kg.	182	182	182	182	181	215	215	—	125	—	—	21	21	6·5	2·722	2·722	2·722	2·722	2·722	2·722	1·5	1·5	0·8	0·8
Weight of Firing Charge — Armour-piercing Shell in kg.	41–78	41–78	45·2	45·2	34	45·5	43	56	28	9·8	15	4·15	6·75	—	—	—	—	—	—	—	—	—	—	—
Weight of Firing Charge — Common Shell . kg.	82	82	67	67	—	—	—	—	13·75	9·8	15	4·15	6·75	1·7	0·43	0·435	0·34	0·24	0·24	0·35	0·143	0·3	0·08	0·08
Muzzle Velocity . . m.	640	640	720	720	625	615	685	775	750	750	850	740	860	780	660	704	640	485	485	600	468	740	550	550
Muzzle Energy, total m. ton .	4258	4258	5386	5386	3609	4209	5138	6575	3564	1301	1671	586	791	202	60·4	68·7	56·8	32·64	32·64	49·95	16·73	41·80	12·3	12·3
Perforation Krupp Steel, 3000 m.	30·5	30·5	38·8	45·9	35·0	44	52	—	34	22	24·1	—	16·5	—	—	—	—	—	—	—	—	—	—	—

Corrected to February, 1910.

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UNITED STATES NAVAL ORDNANCE.

GUN.	MARK.	Length in Calibres.	Total Length.	Capacity of Chamber in Cubic Inches.	Travel of Projectile in Inches.	Weight of Gun.	Weight of Projectile.	Weight of Charge.	Muzzle Velocity.	Muzzle Energy.	Penetration at Muzzle, Krupp Armour, using Capped Projectile.	At 3000 Yards.		At 6000 Yards.		At 9000 Yards.	
												Remaining Velocity.	Penetration.	Remaining Velocity.	Penetration.	Remaining Velocity.	Penetration.
			inch.			tons.	lbs.	lbs.	ft.-seconds.	ft.-tons.	inch.	ft.-seconds.	inch.	ft.-seconds.	inch.	ft.-seconds.	inch.
3-in. B.F.G.	II., III.	50	154	219	128·3	0·9	13	3·85	2700	658	3·3	1230	1·2	848	0·8	..	..
3-in. S.A.	V., VI.	50	159	219	128·3	1·0	13	3·85	2700	658	3·3	1230	1·2	848	0·8	..	..
4-in. R.F.G.	III., IV., V., VI.	40	164	331	134·5	1·5	33	4·85	2000	915	3·4	1156	1·7	897	1·2	..	..
4-in. R.F.G.	VII.	50	205	652	168·3	2·6	33	5·0	2500	1,430	4·6	1432	2·2	979	1·4	853	1·2
4-in. R.F.G.	VIII.	50	205	652	168·3	2·9	33	12·3	2800	1,794	5·3	1627	2·6	1033	1·5	878	1·2
5-in. R.F.G.	II., III., IV.	40	206	656	167·8	3·1	50	10·0	2300	1,834	5·3	1286	2·6	934	1·7	829	1·4
5-in. B.L.R.	V., VI.	50	256	1,200	215·6	4·6	60	19·2	2700	3,032	6·2	1692	3·5	1102	2·0	928	1·6
5-in. B.L.R.	VI.	50	256	1,200	215·6	4·6	50[1]	20·5	3000[1]	3,122	6·4	1732	3·2	1057	1·7	877	1·4
5-in. R.F.G.	VII.	51	261	1,165	215·6	5·0	50	23·8	3150	3,439	6·8	1835	3·4	1091	1·8	895	1·4
6-in. R.F.G.	II., III.	30	196	1,318	145·4	4·8	105	18·8	1950	2,768	5·3	1305	3·2	1009	2·3	909	2·0
6-in. R.F.G.	IV., VII.	40	256	1,320	205·8	6·0	105	18·8	2150	3,365	6·0	1440	3·6	1058	2·4	934	2·1
6-in. R.F.G.	IX.	45	270	1,320	221·7	7·0	105	18·8	2250	3,685	6·3	1511	3·8	1086	2·5	948	2·1
6-in. B.L.R.	VI.	50	300	2,101	247·5	8·3	105	30·0	2600	4,920	7·6	1770	4·7	1207	2·9	996	2·2
6-in. B.L.R.	VIII.	50	300	2,101	247·5	8·6	105	37·0	2800	5,707	8·3	1923	5·2	1297	3·2	1026	2·3
7-in. B.L.R.	II.	45	323	3,643	259·8	12·7	165	58·0	2700	8,338	9·6	1948	6·4	1382	4·2	1083	3·0
8-in. B.L.R.	III., IV.	35	305	3,170	245·8	13·1	260	43·8	2100	7,948	8·6	1576	6·0	1206	4·2	1040	3·6
8-in. B.L.R.	V.	40	343	5,213	273·1	18·1	260	78·0	2500	11,264	10·6	1898	7·5	1428	5·3	1141	4·0
8-in. B.L.R.	VI.	45	369	5,213	299·1	18·7	260	98·5	2750	13,360	12·0	2106	8·6	1589	6·1	1227	4·4
10-in. B.L.R.	I., II.	30	329	6,779	251·1	25·1	510	90·0	2000	14,141	10·7	1590	8·0	1274	6·1	1103	5·0
10-in. B.L.R.	III.	40	413	10,222	327·0	34·6	510	207·5	2700	25,772	15·6	2184	11·9	1747	9·0	1406	6·9
12-in. B.L.R.	I., II.	35	441	11,991	345·2	45·3	870	160·0	2100	26,596	14·2	1733	11·2	1433	8·8	1219	7·2
12-in. B.L.R.	III., IV.	40	493	17,096	392·2	52·1	870	237·5	2400	34,738	16·8	1994	13·3	1649	10·5	1376	8·3
12-in. B.L.R.	III., IV.	40	493	17,096	392·2	52·1	870	305·0[2]	2600[2]	40,768	18·5	2171	14·8	1801	11·7	1500	9·3
12-in. B.L.R.	V.	45	553	16,974	452·0	52·9	870	305·0	2700	43,964	19·4	2259	15·5	1877	12·3	1561	9·8
12-in. B.L.R.	VI.	45	553	14,970	452·0	53·6	870	340·0[3]	2850[3]	48,984	20·8	2393	16·6	1991	13·3	1653	10·6
12-in. B.L.R.	VII.	50	607	14,296	506·3	56·1	870	340·0[3]	2950[3]	52,483	21·7	2483	17·5	2071	13·9	1719	11·0
13-in. B.L.R.	I., II.	35	479	15,068	374·9	61·4	1130	180·0	2000	31,333	15·0	1679	12·0	1414	9·7	1221	8·1
14-in. B.L.R.	II.	45	642	..	..	63·1	1400	365·0	2600	65,606	28·3*	..	23·4*	..	..	..	..

* Harveyized armour.

Corrected to February, 1910.

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ELSWICK B.L. AND Q.F. GUNS AND HOWITZERS.

This Table is supplied by the Manufacturers.

GUNS.

		Semi-Automatic			Semi-Automatic			Semi-Automatic																			
Diameter of Bore .....ins.	1·85	1·85	1·85	2·24	2·24	3	3	3	4	4	4·7	4·7	4·7	6	6	6	7·5	7·5	8	8	9·2	9·2	10	10	12	12	12
do. do. .....mm.	47	47	47	57	57	76	76	76	102	102	120	120	120	152	152	152	190	190	203	203	234	234	254	254	305	305	305
Length of Bore .....cals.	40	46	50	40	50	40	50	50	40	50	40	45	50	40	45	50	45	50	45	50	45	50	45	50	40	45	50
	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons
Weight of Gun	4·51	5 0	7 5	7 5	10·5	12	18·5	23	26	42	42	53	66	6·6	8·4	8·75	13·8	15 75	18·0	20·4	26·75	28 6	36·25	38·25	51	59 3	68
do. do. .....kilos.	230	254	381	381	533	609	940	1164	1321	2134	2134	2692	3353	6706	8535	8890	14021	16003	18289	20727	27179	29059	36832	38864	51818	60252	69090
do. Projectile .. ..lbs.	3·3	3·3	3·3	6	6	12·5	12·5	14·33	31	31	45	45	45	100	100	100	200	200	250	250	380	380	500	500	850	850	850
do. do. .....kilos.	1·5	1·5	1·5	2·722	2·722	5·67	5·67	6·5	14·06	14 06	20 41	20·41	20·41	45·36	45·36	45 36	90·72	90·72	113·4	113·4	172·37	172 37	226·8	226·8	385·55	385·55	385·55
	oz.	oz.	lb. oz.	oz.	lb. oz.	lb. oz.	lb. oz.	lb.	lb.	lb.	lb.	lb. oz.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
do. Charge, M.D. Cordite	8·25	10·0	1 0	10	1 2·5	2 0	3 4	5·75	5·5	11	6·125	9 11	15	24	31	35·5	74	76	80	90	122	136	167	200	260	260	285
do. do. do. kilos.	0·234	0·2·3	0·453	0·283	0·525	0 907	1·474	2·608	2 495	4·99	2·78	4·395	6 804	10·886	14·061	16 1	33 566	34·473	36 29	40·82	55 34	61·69	75·75	90·72	117 93	117·93	129 3
Muzzle Velocity .....f.s.	2132	2300	2680	1968	2400	2210	2800	3050	2300	3·00	2200	2600	3000	2500	2800	3050	2900	3000	2845	3000	2750	3000	2800	3000	2650	2800	3000
do. do. .....m.s.	650	701	817	600	731	674	853	930	701	914	670	792	914	762	853	930	884	914	867	914	838	914	853	914	808	853	914
Muzzle Energy .....f.t.	104	121	164	161	240	423	680	922	1137	1934	1510	2109	2·08	4334	5436	6492	11663	12441	14031	15600	19926	23714	27181	33·18	41386	46208	53010
do. do. .....m.t.	33·2	37 5	50·8	49·8	74·3	131	210 6	285·5	352·1	598·9	467·6	653	869·6	1342·2	1683·4	2010·5	3411 9	3865·2	4345·2	4831·2	6171	7344	8418	10318	12816	14310	16426
Penetration at Muzzle ...ins.	5·2	5·7	7 3	5.6	8·0	8·8	11·6	14 4	11·9	16·0	11 6	15·45	19·4	19·5	23·1	26·3	31·8	32·75	32·9	35·7	35·9	40·8	40 9	45·1	44·6	48·5	53·7
do. do. ...mm.	132	144·7	185·4	142·2	203·2	223 5	294 6	365·7	302 2	408 4	294·6	392·4	492·7	495·3	586·7	658	807·7	832·3	835·6	908·7	911·8	1036·3	1038·8	1145·5	1132·8	1231·8	1363·9
Rounds per Minute.....	25	25	25	25	25	20	20	30	12	12	12	12	12	9	9	9	6	6	5	5	4	4	3	3	2	2	2

Larger Guns are under construction, but details are withheld from publication.

HOWITZERS AND FIELD GUNS.

		Naval Landing.	Jointed Gun.	Field.	Horse & Field.	Field.	Howitzers.			Field Position.	Howitzers.							
Diameter of Bore ... ... ins.	2·953	3	3	3	3	3·3	4	4·3	4·7	5	5	6	8	9·2	11	11·24	12	
,, ,, ... mm.	75	76	76	76	76	84	102	109·2	120	127	127	152	203	234	279·4	285·5	305	
Length of Bore ... ... calibres	14·13	18·8	19·2	28	23	28	8·75	12·5	12	32	8·4	12·2	12	13·7	12	15	17	
	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	lb.	cwt.	cwt.	tons	cwt.	ton	tons	tons	tons	tons	tons	
Weight of Gun	1·875	4	4·5	7·25	6	9	220	7	8	2	9	1	2·6	4·3	5·5	7·85	12·2	
,, ,, ... kilos.	95	203	229	368	305	457	100	356	406	2032	457	1016	2642	4369	5588	7976	12396	
,, Projectile ... lbs.	11·75	12·5	14·33	14·3	12·5	18·5	20	40	35	60	50	100	240	290	500	661·38	981	771
,, ,, ... kilos.	5·33	5·67	6·5	6·49	5·67	8·39	9·07	18·14	15·87	27·22	22·68	45·36	108·9	131·5	227	300	445	350
	oz.	oz.	oz.	oz.	lb. oz.	lb. oz.	oz.	oz.	lb. oz.	lb. oz.	oz	lb.	lb.	lb.	lb.	lb.	lb.	lb.
,, Charge M.D. Cordite	7·75	15	15	20¼	1 4	1 6	9½	16¼	1 4¼	9 8	12	3	7·5	14	20	32	46·29	50
,, ,, ,, kilos.	0·22	0·369	0·425	0·582	0·567	0·624	0·269	0·461	0·582	4·31	0·34	1·361	3·4	6·35	9·07	14·51	21	22·7
Muzzle Velocity ... ... f.s.	1100	1570	1485	1755	1700	1615	950	980	1150	2150	782	1000	1000	1250	1220	1230	1265	1460
,, ,, ... m.s.	335	478	452	535	518	498	290	298	350	655	238	305	305	381	372	375	345	445

Corrected to March, 1911.

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VICKERS, SONS & MAXIM'S GUNS AND MOUNTINGS.

This Table is supplied by the Manufacturers.

		37 mm. 30 cal.	37 mm. 42·5 cal.	3-pdr. 50 cal.	6-pdr. 50 cal.	Mountain. 3-in.-124-pr. 14·3 cal	Field. Light. 3-in. 22 cal.	Field. Heavy. 2·95-in. 30 cal.	3-in. Semi-Aut. 50 cal.	4-in. 50 cal.	4·33-in. Howitzer. 13·5 cal.	4·7-in. 45 cal.	4·7-in. 48·4 cal.	6-in. Howitzer.	6-in. 45 cal.	6-in. 50 cal.	7·5-in. 45 cal.	7·5-in. 50 cal.	8-in. 48·5 cal.	9·2-in. 47 cal.	9·2-in. 50 cal.	10-in. 45 cal.	10-in. 48·6 cal.	12-in. 45 cal.	12-in. 50 cal.
Gun.	Diameter of Bore . .ins.	1·457	1·457	1·85	2·244	3	3	2·95	3	4	4·33	4·724	4·724	6	6	6	7·5	7·5	8	9·2	9·2	10	10	12	12
	Length of Bore . .ins.	43·5	62	92·5	112·2	42·94	64·96	99·46	150	201·15	58·45	212·6	228·45	94·5	269·5	300	337·5	375	388·75	429·3	460	450	486	540	600
	Length of Gun . .ins.	73·75	94	98·9	118·6	47·23	69·3	103·8	156·995	208·45	63·55	220	236·2	102·8	279·2	310·07	349·2	386·7	400	442·35	473	464·6	500	557·55	617·7
	Maximum pressure in Chamber, tons per sq.in.	13	14	17	16	12	16	16·0	17	18	12·5	17	18	9·85	17·75	18	18	17·5	18	18	18	18	18	18	18·5
	Weight of Charge lbs.	·0782	·1875	1·066	1·55	·5	1	1·032	3·625	11·25	1·0	19	17	5·3	35·25	43	78·25	80·03	90	170·5	184	199·5	172	356	344
	Weight of Projectile lbs.	1	1·25	3·3	6	12·5	12·5	14·33	12·5	31	35·27	45	45·14	90·3	100	100	200	200	216·7	380	380	478·4	496·6	850	850
	Weight of Gun . . .	c. q. l. 3 2 24	c. q. l. 5 1 19	c. q. l. 5 2 4	c. q. l. 9 1 5	c. q. l. 2 1 23	c. q. l. 4 2 0	c. q. l. 7 2 6	c. q. l. 19 0 0	t. c. q. 2 1 3	c. q. 7 1	t. c. q. 3 3 3	t. c. q. 3 2 0	c. q. 18 3	t. c. q. 7 8 2	t. c. q. 7 16 0	t. c. q. 14 0 2	t. c. q. 16 0 0	t. c. q. 14 3 0	t. c. q. 28 1 0	t. c. q. 27 16 1	t. c. q. 34 17 0	t. c. q. 27 17 0	t. c. q. 57 14 0	t. c. q. 65 17 0
	Muzzle Velocity . .f.s.	1800	2300	2800	2600	1150	1600	1660	2700	3030	1045	2925	3050	1285	3012	3190	2875	3007	3090	3025	3070	2850	2863	2950	3010
	Muzzle Energy . .f.t.	22·5	45·85	179·4	281	115	220	274	632	1975	267	2670	2910	1035	6290	7056	11465	12540	14350	24110	24835	26945	28225	51290	53400
	Penetration of Wrought Iron Plate at Muzzle. Gavre formula . .ins.	1·9	3·3	6·7	7·5	..	..	..	9·65	16·0	..	16·65	17·8	..	23·65	25·8	28·75	30·75	31·5	39·25	39·95	38·9	40·2	50·65	52·1
	Penetration of Mild Steel Plate at Muzzle. Gavre formula . . . .ins.	1·5	2·6	5·1	5·4	..	..	..	7·5	12·4	..	12·9	13·8	..	18·4	20	22·25	23·7	24·4	30·45	31·0	30·1	31·15	39·25	40·4
	Penetration of Hard Steel Plate at 3000 yards. Gavre formula . ins.	..	..	..	..	..	..	..	..	..	..	..	4·5	..	6·3	7·2	8 9	9·35	9·8	13·35	13·75	13·8	14·65	19·5	20·0
	Rounds per minute . .	300	300	30	28	20	25	20	25	15	..	12	12	..	10	10	8	8	6	4	4	3	3	2	2
Mounting.	Weight of Mounting complete with Shield . .	c. q. l. 4 1 10	c. q. l. 4 3 20	c. q. l. 11 3 0	c. q. l. 14 2 0	c. q. l. 7 3 0	Weight of carriage without limber. c. q. l. 11 3 0	Wht. of car. and limber with 24 rounds. t. c. q. 1 5 1	t. c. q. l. 1 0 2 0	t. c. q. l. 2 4 2 0	Weight of carriage without limber. c. q. l. 17 3 0	t. c. q. l. 3 13 3 0	t. c. q. l. 5 9 2 0	Weight of carriage without limber. t. c. q. l. 2 14 3 0											
	Thickness of Shield .ins.	·1875	·16	·25	no	·1	·125	·144	no	no	no	2 & ·313	3	·23											
	Weight of Shield . . .	q. l. 3 11	q. l. 1 22	c. q. l. 1 0 0	shield	q. l. 1 17	q. l. 2 0	c. q. l. 1 0 15	shield	shield	shield	c. q. l. (17 0 0) (1 1 0)	t. c. q. l. 1 12 2 0	c. q. 3 3											
	Angle of Elevation . .	16°	15°	20°	20°	25°	16°	16°	20°	15°	50°	20°	20°	50°											
	Angle of Depression . .	25°	20°	20°	10°	15°	6°	10°	10°	10°	5°	7°	10°	0°											

Depending on type of Mounting used.

Corrected to February, 1910.

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COVENTRY ORDNANCE WORKS' GUNS.

This Table is supplied by the Manufacturers.

		3-pdr., 50 cal.	6-pdr., 50 cal.	Mountain 3·3-in. 20-pdr., Howitzer.	Field. 12½-pdr., 23 cal	Field. 18-pdr., 33·44 cal.	Field. 4·65-in. Howitzer.	Field. 6-in. Howitzer.	3-in., 40 cal.	3-in., 50 cal.	4-in., 40 cal.	4-in., 50 cal.	4·7-in., 50 cal.	6-in., 50 cal.	7·5-in., 50 cal.	9·2-in., 50 cal.	12-in., 50 cal.	13·5-in., 45 cal.	14-in., 45 cal.
Diameter of Bore	in.	1·85	2·244	3·3	3·0	3·0	4·65	6·0	3·0	3·0	4·0	4·0	4·7	6·0	7·5	9·2	12·0	13·5	14·0
	m.m.	47	57	83·8	76·2	76·2	117·5	152·4	76·2	76·2	101·6	101·6	120·0	152·4	190·5	233·7	304·8	342·9	355·6
Length of Gun	in.	99·0	119·0	45·25	75·0	100·34	72·0	101·5	123·6	154·5	166·4	208	242·5	310	387·5	475	617·7	630	648·7
Weight of Charge	lb.	1·1	1·75	0·5	1·0	1·626	1·1	5·0	2·0	5·25	5·25	11·25	16·0	31·0	71·0	95	285	290	300
Weight of Projectile	lb.	3·3	6·0	20·0	12·5	15·0	37·5	100	12·5	12·5	31	31	45	100	200	380	850	1250	1400
Weight of Gun		c. 6	c. 10	c. q. 2 2	c. 6	c. q. 8 2	c. q. 8 2	t. c. q. 1 2 2	c. q. 12 1	c. q. l. t. 18 2 21 1	c. q. l. 5 3 15	t. c. 2 2	t. c. q. 3 14 2	t. c. 8 15	t. c. 15 10	t. 28	t. 67	t. c. 76 10	t. 81
Muzzle Velocity	f.-sec.	2800	2800	860	1600	1850	1000	1120	2300	3000	2300	3000	3000	2950	2950	2950	2950	2600	2600
Muzzle Energy	f.-tons	179·4	326	102	222	356	260	870	458·5	780	1137	1934	2810	6034	12068	22930	51290	58590	65620
Penetration of Wrought-Iron Plate at Muzzle	in.	..	..	..	..	..	..	..	7·7	11·25	10·8	16·0	17·4	23·1	29·8	37·9	50·65	49·1	51·2
Penetration of Hard Steel Plate at 5000 yards	in.	..	..	..	..	..	..	..	..	..	..	..	2·6	5·5	8·5	12·3	18·3	18·3	19·3

Corrected to February, 1911.

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SCHNEIDER GUNS.

The information in this Table is given by the Manufacturers.

Calibre, in millimètres.	400		370		340		305		240		150		120		100		75		47	37
Calibre, in inches	15·7	15·7	14·5	14·5	13·4	13·4	12·0	12·0	9·4	9·4	5·9	5·9	4·7	4·7	3·9	3·9	2·9	2·9	1·8	1·4
Length, in calibres	40	45	40	45	40	45	45	50	45	50	45	50	45	50	45	50	50	60	60	60
Weight, in tons	99·4	102·5	78·9	83·6	63·7	66·3	52·9	57·3	25·8	27·9	6·3	6·8	3·2	3·5	1·9	2·0	·85	1·2	·30	·17
Weight of A.P. Projectile, lbs.	2183	2183	1719	1719	1332	1332	826	826	407	407	99	99	48	48	28·6	28·6	14·3	14·3	3·3	1·76
Weight of Charge, in lbs.	540	540	496	496	447	447	353	375	165	176	39·6	40·7	17·8	18·4	13·2	13·8	5·5	6·2	1·3	..
Muzzle Velocity, ft.-secs.	2428	2493	2493	2575	2559	2675	2952	3116	2952	3116	2952	3116	2952	3116	2952	3116	2871	3035	3116	3116
Muzzle Energy, ft.-tons	89444	94287	74268	79272	60706	65388	50007	55717	24667	27487	6001	6686	2932	3268	1734	1931	820	917	223	119
Perforation of Steel at muzzle (ins.)	...	..	.		..	..	38·3	41·6	30·1	32·3	18·2	20·1	13·9	15·0	11·6	12·5	9·3	10·0	5·9	5·0
Perforation of Steel at 3000 yards (ins.)	..	..	..	..	..	..	29·3	31·9	21·2	23·1	10·2	11·8	6·4	6·9	4·6	4·9	..	..	..	..
Perforation of Steel at 6000 metres (6561 yards), ins.	17·9	18·7	16 6	17·5	15·2	16·1	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Corrected to February, 1911.

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KRUPP SHIP AND COAST GUNS.

From tables supplied by the Company.

Calibre . . . . cm.	7·5 = 2·9 in.						8·8 = 3·4 in.						10·5 = 4·1 in.			12 = 4·7 in.			15 = 5·9 in.		
Total Length . . cals.	40		45		50		40		45		50		40	45	50	40	45	50	40	45	50
Total Length . . mm.	3000		3375		3750		3520		3960		4400		4200	4725	5250	4800	5400	6000	5965	6710	7455
Length of Bore . . „	3195		3570		3945		3750		4190		4630		4475	5000	5525	5110	5710	6310	6355	7100	7845
Weight of Gun, light kg.	593	..	673	..	753	..	959	..	1087	..	1217	..	1555	1755	1950	2325	2620	2910	4460	5020	5590
Weight of Gun, heavy . „	..	677	..	764	..	850	..	1094	..	1234	..	1373	1725	1945	2165	2575	2900	3230	4940	5570	6200
Weight of Projectile . „	5·8	5·8	5·8	5·8	5·8	5·8	9·5	9·5	9·5	9·5	9·5	9·5	16	16	16	24	24	24	46	46	46
Weight of Charge . . „	1·54	1·65	1·77	1·86	2·03	2·09	2·49	2·66	2·86	3·00	3·27	3·37	5·05	5·80	6 60	7·50	8·65	9·85	14·1	16·6	18·9
Muzzle Velocity, . . m.	816	843	866	892	913	938	811	837	860	886	907	931	840	890	936	839	888	933	839	888	934
Muzzle Energy metre-tons	197·0	210·1	221·9	235·4	246·8	260·3	318·3	339·4	358·5	380·3	398·7	420·5	576	646	714	861	964	1066	1651	1850	2045
Muzzle Energy per metre-kg. of weight . kilog.	332	..	330	..	328	..	332	..	330	..	328	..	370	368	366	370	368	366	370	368	366
	..	310	..	308	..	306	..	310	..	308	..	306	334	332	330	334	332	330	334	332	330
Penetration at the Muzzle (Steel) . . . . mm.	195	204	212	221	229	238	231	242	252	262	271	281	292	317	341	338	366	393	426	462	496
Penetration at 6000 metres mm.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	446	476	505

Calibre . . . . .cm.	17 = 6·7 in.			19 = 7·5 in.			21 = 8·2 in.			24 = 9·4 in.			28 = 11 in.			30·5 = 12 in.			35·5 = 14 in.		
Total Length . . cals.	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50
Total Length . . mm.	6905	7765	8630	7600	8550	9500	8370	9420	10465	9600	10800	12000	11200	12600	14000	12200	13725	15250	14200	15975	17750
Length of Bore . . „	7355	8215	9080	8095	9045	9995	8915	9965	11010	10225	11425	12625	11930	13330	14730	12995	14520	16045	15125	16900	18675
Weight of Gun, light kg.	6930	7800	8680	9230	10400	11550	12330	13900	15450	18600	21000	23300	29550	33300	37000	38200	43000	47800	60200	67800	75400
Weight of Gun, heavy „	7670	8650	9630	10220	11520	12830	13660	15400	17150	20600	23220	25850	32700	36900	41000	42300	47700	53100	66700	75200	83700
Weight of Projectile. „	70	70	70	95	95	95	125	125	125	190	190	190	300	300	300	390	390	390	620	620	620
Weight of Charge . „	22·4	25·7	29·3	29·8	34·3	39·1	39·9	45·8	52·3	60·1	69·1	78·8	95	110	125	123	142	162	195	224	255
Muzzle Velocity . . m.	848	897	943	840	889	934	847	896	942	843	893	939	846	895	941	843	892	939	840	889	935
Muzzle Energy metre-tons	2564	2873	3177	3416	3827	4232	4566	5116	5657	6884	7714	8529	10930	12250	13550	14130	15830	17510	22280	24960	27650
Muzzle Energy per metre-kg. of weight . kilog.	370	368	366	370	368	366	370	368	366	370	368	366	370	368	366	370	368	366	370	368	366
	334	332	330	334	332	330	334	332	330	334	332	330	334	332	330	334	332	330	334	332	330
Penetration at the Muzzle (Steel) . . . . mm.	499	541	581	553	600	643	613	664	713	709	770	827	837	907	974	917	994	1069	1079	1170	1258
Penetration at 6000 metres mm.	488	521	553	514	548	581	540	576	610	573	611	648	608	648	685	624	664	704	651	693	732

Corrected to February, 1911.

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BETHLEHEM STEEL CO.

ORDNANCE.

This Table is supplied by the Manufacturers.

Calibre.	Length of bore in Calibres.	Calibre.	Weight of Gun.	Weight of Projectile.	At Muzzle.		Perforation of Wrought Iron. (Gavre Formulæ.)	At 3000 yards Range.			At 8000 yards Range.			Limiting ranges beyond which capped armour piercing projectiles will not perforate Krupp hard-faced armour of 12 inches and 7 inches thickness.		Calibre.
					Velocity.	Energy.		Dangerous Space for Target 25 feet high.	Energy.	Perforation of Bethlehem hard-faced armour by capped armour piercing projectiles, with normal impact.	Dangerous Space for Target 25 feet high.	Energy.	Perforation of Bethlehem hard-faced armour by capped armour piercing projectiles, with normal impact.	12-in. plate.	7-in. plate.	
inches.	calibres.	cms.	lbs.	lbs.	ft. per sec.	foot-tons.	inches.	yards.	foot-tons.	inches.	yards.	foot-tons.	inches.	yards	yards.	inches.
1·457	50	3·7	120	1	2150	37	..	..	..	..	..	..	..	..	..	1·457
1·851	50	4·7	550	3	2400	119	..	..	..	..	..	..	..	..	..	1·851
2·244	50	5·7	960	6	2400	240	..	..	..	..	..	..	..	..	..	2·244
3	50	7·62	1900 tons.	13	2800	707	..	..	..	..	..	..	..	..	..	3
4	45	10·16	2·3	33	2600	1,545	9·8	240	755	..	..	..	..	..	..	4
4	50	10·16	2·6	33	2800	1,793	10·9	279	889	..	..	..	..	..	..	4
5	45	12·7	3·4	50	2600	2,342	11·3	225	1,996	..	..	..	..	..	..	5
5	50	12·7	4·75	50	3000	3,118	13·8	330	1,514	..	..	..	..	..	..	5
6	45	15·24	7·2	105	2600	4,965	16·9	275	2,970	6·9	55	1,307	4·1	..	2,870	6
6	50	15·24	8·4	105	2800	5,706	18·7	321	3,478	7·6	68	1,546	4·6	..	3,890	6
7	45	17·78	12·7	165	2700	8,339	22·0	221	5,431	6 9	69	2,660	5·8	..	6,063	7
7	50	17·78	14·5	165	2900	9,619	24·3	360	6,263	10·6	89	1,948	4·8	..	7,063	7
8	35	20·32	15·2	316	2250	10,500	28·3	235	8,240	11·0	60	5,060	8·1	..	10,230	8
8	45	20·32	18·6	260	2800	14,230	29·1	350	9,860	12·3	85	5,457	8·6	3,240	10,420	8
8	50	20·32	22·3	260	2900	15,260	30·6	381	10,601	12·8	94	5,885	8·9	3,950	11,235	8
10	35	25·4	30·0	604	2250	21,200	38·6	245	16,580	14·8	65	11,120	11·5	7,300	Max. range	10
10	45	25·4	35·4	515	2800	27,990	40·8	370	21,080	17·2	95	13,160	12·8	9,075	Max. range	10
10	50	25·4	43·9	515	2900	30,020	42·6	395	22,660	18·0	108	14,490	13·5	10,000	Max. range	10
12	35	30·48	52·0	1046	2250	36,700	50·1	250	29,880	19·1	70	21,700	15·6	14,180	Max. range	12
12	45	30·48	53·8	870	2800	47,290	51·7	380	36,790	21·7	105	24,615	16·9	14,560	Max. range	12
12	50	30·48	66	870	2900	50,720	54·4	406	39,990	22·9	115	26,590	17·6	15,596	Max. range	12
14	35	35·56	57·4	1660	2150	53,190	50·4	230	44,660	22·3	70	33,650	18·7	Max. range	Max. range	14
14	45	35·56	70·3	1400	2500	60,650	55·3	313	49,610	23·7	90	35,370	19·2	Max. range	Max. range	14
18	30	45·72	60·0	2075	2150	66,490	49·2	225	52,750	21·1	65	36,360	16·7	15,100	Max. range	18

Guns less than 3-inch calibre are chambered for fixed ammunition with the powder and projectiles in brass cartridge cases. Guns from 3-inches calibre upwards, and including the 6-inch L45 gun, can be chambered to use either fixed ammunition, or chambered to use loose ammunition with the powder in cartridge bags and the projectile separate from the powder. Guns above 6-inches calibre and including the 6-inch L45 gun are chambered for loose ammunition. The breech mechanisms of all guns up to 10-inches are operated by the single motion of a hand-lever. Those of the larger guns are operated by the revolution (3 to 5 turns) of a crank.

The 8-inch, 10-inch and 12-inch L50-guns, and the 14-inch L45 gun are for use in turrets, and are of great weight at the breech in order to balance the long muzzles, so that a comparatively small barbette may be used.

Corrected to March, 1911.

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BOFORS GUNS.

Table supplied by the Manufacturers.

Calibre . . . . . cm.	30·5			28			25·4			24			21		
Calibre . . . . . in.	12			11·02			10			9·45			8·27		
Length of Gun . . . . cal.	50	45	40	50	45	40	50	45	40	50	45	40	50	45	40
Length of Gun . . . . in.	600·4	540·3	480·3	551·2	496·1	441	500	450	400	472·4	425·2	378	413·4	372	330·7
Weight of Gun . . . . tons	50	44	40	39	35	30	29	26	23	24	22	19	16	14·4	12·8
Weight of Projectile . . . lb.	981 772	981 772	981 772	761 595	761 595	761 595	564 445	564 445	564 445	474 375	474 375	474 375	309 249	309 249	309 249
Weight of Charge . . . lb.	266	239	213	205	184	164	153	138	123	129	116	103	84	75·8	67·5
Muzzle Velocity . . . ft.-secs.	2776 3140	2625 2969	2477 2802	2776 3140	2625 2969	2477 2802	2789 3140	2638 2969	2490 2802	2789 3140	2638 2969	2490 2802	2828 3150	2677 2979	2526 2812
Muzzle Energy . . . ft.-tons	52583	47019	41877	40767	36452	32468	30536	27320	24349	25647	22944	20448	17174	15391	13705
Penetration of soft steel plate at muzzle de Marres formula } in.	39·8	36·8	33·9	36·4	33·6	30·9	32·9	30·3	27·9	30·8	28·5	26·2	26·7	24·7	22·7
Number of rounds per minute .	2	2	2	2	2	2	3	3	3	4	4	4	4	4	4

Calibre . . . . . cm.	19·4			15·24			12			10·5			8·7			7·5		
Calibre . . . . . in.	7·64			6			4·72			4·13			3·43			2·95		
Length of Gun . . . . cal.	50	45	40	50	45	40	50	45	40	50	45	40	50	45	40	50	45	40
Length of Gun . . . . in.	381·9	343·7	305·5	300	270	240	236·2	212·6	189	227·4	206·7	186	188·4	171·3	154·1	162·4	147·6	132·9
Weight of Gun . . . . tons	12·8	11·6	10·3	5·8	5·3	4·7	2·96	2·56	2·37	2·2	2	1·8	1·88	1·14	1·05	0·72	0·665	0·59
Weight of Projectile . . . lb.	251 198	251 198	251 198	112·4 90·4	112·4 90·4	112·4 90·4	59·5 46·3	59·5 46·3	59·5 46·3	39·7 30·9	39·7 30·9	39·7 30·9	22·7 17·6	22·7 17·6	22·7 17·6	14·5 11·5	14·5 11·5	14·5 11·5
Weight of Charge . . . lb.	68·1	61·3	54·7	33·1	29·8	26·5	16·2	14·5	12·9	10·8	9·7	8·7	6 14	5·53	4·92	3·92	3·53	3·13
Muzzle Velocity . . . ft.-secs.	2786 3140	2635 2969	2487 2802	2897 3235	2749 3051	2582 2884	2789 3143	2638 2973	2474 2805	2871 3251	2733 3097	2585 2933	2864 3248	2726 3084	2582 2936	2848 3215	2717 3074	2572 2907
Muzzle Energy . . . ft.-tons	13566	12136	10815	6565	5913	5215	3220	2881	2567	2267	2057	1841	1292	1169	1049	817	742·7	668·5
Penetration of soft steel plate at muzzle de Marres formula } in.	24·6	22·7	20·9	19	17·6	16·1	14·7	13·6	12·5	13·2	12·3	11·4	10·8	10·1	9·4	9·2	8·5	7·9
Number of rounds per minute .	5	5	5	9	9	9	11	11	11	15	15	15	17	17	17	20	20	20

Corrected to February, 1911.

Table Relating to Conversion of Measures.

Length.

Metric to English. | English to Metric.

I. Mètres.	II. Yards.	III. Feet.	IV. Inches.	V. Yards.	VI. Mètres.	VII. Feet.	VIII. Mètres.	IX. Inches.	X. Centimètres.
1	1·0936	3·2809	39·37	1	0·91438	1	0·30479	1	2·5400
2	2·1873	6·5618	78·74	2	1·82877	2	0·60959	2	5·0799
3	3·2809	9·8427	118·11	3	2·74315	3	0·91438	3	7·6199
4	4·3745	13·1236	157·48	4	3·65753	4	1·21918	4	10·1598
5	5·4682	16·4045	196·85	5	4·57192	5	1·52397	5	12·6998
6	6·5618	19·6854	236·22	6	5·48630	6	1·82877	6	15·2397
7	7·6554	22·9663	275·60	7	6·40068	7	2·13356	7	17·7797
8	8·7491	26·2472	314·97	8	7·31507	8	2·43836	8	20·3196
9	9·8427	29·5281	354·34	9	8·22945	9	2·74315	9	22·8596

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of yards in 2354 mètres (see cols. I. & II.).	of feet in 12·4 mètres (see cols. I. & III.).	of inches in 30·5 centimètres (see cols. I. & IV.). Note, 1 m.=100 cm.	of mètres in 1026 yards (see cols. V. & VI.).	of mètres in 1742 feet (see cols. VII. & VIII.).	of centimètres in 17·72 ins. (see cols. IX. & X.)
mètres. yards.				feet. mètres.	inches. cms.
2000=2187·3	mètres. feet.	cms. inches.	yards. mètres.	1000=304·79	10·0 =25·400
300= 328·09	10 =32·809	30·0=11·811	1000=914·38	700=213·36	7·0 =17·780
50= 54·68	2 = 6·562	·5= ·197	20= 18·29	40= 12·19	0·7 = 1·778
4= 4·37	0·4= 1·312		6= 5·49	2= 0·61	·02= ·051
∴ 2354=2574·44	∴ 12·4=40·683	∴ 30·5=12·008	∴ 1026=938·16	∴ 1742=530·95	∴ 17·72=45·009

Note.—A ready way of approximately converting all French measures into English inches is to multiply by 4 and apply the decimal point by common sense—Thus for a 15-cm. gun; 15 × 4 = 60. Now this Calibre cannot be 60 inches, nor can it be 0·6 inch; therefore it must be 6 inches. (The exact value is 5·906 in.)

Weight.

Metric to English. | English to Metric.

I. Kilogrammes.	II. Tons.	III. Pounds Avoirdupois.	IV. Grains Troy.	V. Tons.	VI. Milliers.	VII. Pounds Avoirdupois.	VIII. Kilogrammes.	IX. Grains. Troy.	X. Gramme
1	·000984	2·2046	15432·3	1	1·016	1	0·4536	1	·0648
2	·001968	4·4092	30864·7	2	2·032	2	0·9072	2	·1296
3	·002953	6·6139	46297·0	3	3·048	3	1·3608	3	·1944
4	·003937	8·8185	61729·4	4	4·064	4	1·8144	4	·2592
5	·004921	11·0231	77161·7	5	5·080	5	2·2680	5	·3240
6	·005905	13·2277	92594·1	6	6·096	6	2·7216	6	·3888
7	·006889	15·4323	108026·4	7	7·112	7	3·1751	7	·4536
8	·007874	17·6370	123458·8	8	8·128	8	3·6287	8	·5184
9	·008858	19·8416	138891·1	9	9·144	9	4·0823	9	·5832

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of tons in 35 milliers see cols. I. & II. Note, 1000 kg. =1 millier).	of pounds in 56·3 kilogrammes. (see cols. I. & III.).	of grains in 120 grammes (see cols. I. & IV. Note, 1000 grms. = 1 kg.)	of milliers in 38 tons (see cols. V. & VI.).	of kilogrammes in 68 pounds (see cols. VII. & VIII).	of grammes in 85 grains (see cols. IX. & X.).
milliers. tons.	kgrms. lbs.	grammes. grains.	tons. milliers.	lbs. kgs.	grains. grammes.
30 = 29·53	50 =110·231	100=1543·23	30 = 30·48	60 = 27·216	80 = 5·184
5 = 4·92	6 = 13·228	20= 308·65	8 = 8·13	8 = 3·629	5 = 0·324
	0·3= ·661				
∴ 35 = 34·45	∴ 56·3=124·120	∴ 120=1851·88	∴ 38 = 38·61	∴ 68 = 30·845	∴ 85 = 5·508

Note.—7000 grains troy = 1 pound avoirdupois.

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PRESSURE.

Metric to English.			English to Metric.				Atmospheric to English.		English to Atmospheric.	
I. Kilogrammes per square centimètre.	II. Pounds per square inch.	III. Tons per square inch.	IV. Pounds per square inch.	V. Kilogrammes per square centimètre.	VI. Tons per square inch.	VII. Kilogrammes per square centimètre.	VIII. Atmospheres.	IX. Tons per square inch.	X. Tons per square inch.	XI. Atmospheres.
1	14·223	·00635	1	·07031	1	157·49	1	·00656	1	152·38
2	28·446	·01279	2	·14062	2	314·99	2	·01313	2	304·76
3	42·668	·01905	3	·21093	3	472·48	3	·01969	3	457·14
4	56·891	·02540	4	·28124	4	629·97	4	·02625	4	609·52
5	71·114	·03175	5	·35155	5	787·47	5	·03281	5	761·91
6	85·337	·03810	6	·42186	6	944·96	6	·03938	6	914·29
7	99·560	·04445	7	·49217	7	1102·45	7	·04594	7	1066·67
8	113·783	·05080	8	·56248	8	1259·95	8	·05250	8	1219·05
9	128·005	·05715	9	·63279	9	1417·44	9	·05906	9	1371·43

NOTE.—One atmosphere is taken to be 14·7 lbs. per square inch.

EXPLANATION.—To convert any number from one measure to the other, take the value of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of pounds per square inch in 32·1 kilogrammes per square centimètre (see cols. I. & II.).		of tons per square inch in 3210 kilogrammes per square centimètre (see cols. I. & III.).		of kilogrammes per square centimètre in 15 lbs. per square inch (see cols. IV. & V.).		of kilogrammes per square centimètre in 18 3 tons per square inch (see cols. VI. & VII.).		of tons per square inch in 3254 atmospheres. (see cols. VIII. & IX.).		of atmosphere in 14·6 tons per square inch (see cols. X. & XI.).	
kgs. per sq. cm.	lbs. per sq. in.	kgs. per sq. cm.	tons per sq. in.	lbs. per sq. in.	kgs. per sq. cm.	tons per sq. in.	kgs. per sq. cm.	atmospheres.	tons per sq. inch.	tons per sq. in.	atmospheres.
30 =	426·68	3000 =	19·05	10 =	·7031	10 =	1574·9	3000 =	19·69	10 =	1523·8
2 =	28·45	200 =	1·27	5 =	·3516	8 =	1259·95	200 =	1·31	4 =	609·5
0·1 =	1·42	10 =	·06			0·3 =	47·25	50 =	·33	0·6 =	91·4
∴ 32·1 =	456·55	∴ 3210 =	20·38	∴ 15 =	1·0547	∴ 18·3 =	2882·10	4 =	·03	∴ 14·6 =	2224·7
								∴ 3254 =	21·36		

ENERGY.

Metric to English.		English to Metric.	
I. Mètre-tons.	II. Foot-tons.	III. Foot-tons.	IV. Mètre-tons.
1	3·2291	1	0·3097
2	6·4581	2	0·6194
3	9·6872	3	0·9291
4	12·9162	4	1·2388
5	16·1453	5	1·5484
6	19·3743	6	1·8581
7	22·6034	7	2·1678
8	25·8324	8	2·4775
9	29·0615	9	2·7872

1 mètre-ton is termed a "dinamode" in Italy.

EXPLANATION.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus find the number

of foot-tons in 4367 mètre-tons (see cols. I. & II.).		of mètre-tons in 3592 foot-tons (see cols. III. & IV.).	
mètre-tons.	foot-tons.	foot-tons.	mètre-tons.
4000 =	12916·2	3000 =	929·1
300 =	968·72	500 =	154·84
60 =	193·74	90 =	27·87
7 =	22·60	2 =	·62
∴ 4367 =	14101·26	∴ 3592 =	1112·43

PERFORATION THROUGH IRON AND STEEL WITH THE FACE NOT HARDENED.

To obtain perforation through steel equivalent to a given perforation through iron, and *vice versâ*.

1 inch steel = 1¼ inches iron;

that is, 4 inches steel = 5 inches iron.

Thus, given 9·4 inches perforation through iron,

$$9{\cdot}4 \times \frac{4}{5} = 7{\cdot}52 \text{ inches steel;}$$

or, given 5·2 inches steel,

$$5{\cdot}2 \times \frac{5}{4} = 6{\cdot}5 \text{ inches iron.}$$

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PART IV.

STATISTICS, OFFICIAL STATEMENTS AND PAPERS.

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STATEMENT showing the NET EXPENDITURE from NAVY VOTES and LOANS on account of NAVAL SERVICES for the Years 1901–2 to 1909–10, together with the ESTIMATES for 1910–11 and 1911–12.

Year.	Total Expenditure from Navy Votes (Net).	Annuity in Repayment of Loans under the Naval Works Acts.	Total Expenditure exclusive of Annuity [Column (2) deducted from Column (1).]	Expenditure from Loans under Naval Works Acts.	Total of Columns (3) and (4).	Expenditure on New Construction (Vote 8).
	(1)	(2)	(3)	(4)	(5)	(6)
	£	£	£	£	£	£
1901–2	30,981,315	122,255	30,859,060	2,745,176	33,604,236	8,865,080
1902–3	31,003,977	297,895	30,706,082	3,198,017	33,904,099	8,534,917
1903–4	35,709,477	502,010	35,207,467	3,261,083	38,468,550	11,115,733
1904–5	36,859,681	634,238	36,225,443	3,402,575	39,628,018	11,263,019
1905–6	33,151,841	1,015,812	32,136,029	3,313,604	35,449,633	9,688,044
1906–7	31,472,087	1,094,309	30,377,778	2,431,201	32,808,979	8,861,897
1907–8	31,251,156	1,214,403	30,036,753	1,083,663	31,120,416	7,832,589
1908–9	32,181,309	1,264,033	30,917,276	948,262	31,865,538	7,406,930
1909–10	35,734,015	1,325,809	34,408,206	—	34,408,206	9,597,551
1910–11 (estimated) . . .	40,603,700	1,322,752	39,280,948	—	39,280,948	13,279,830
1911–12 (estimated) . . .	44,392,500	1,322,752	43,069,748	—	43,069,748	15,063,877

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First Lord's Statement explanatory of Navy Estimates, 1911–12.

THE Estimates for 1911–12 amount to £44,392,500, as compared with £40,603,700 for the current year.

The principal increases occur under the heads of Pay of *Personnel* (Vote I.), Victualling and Clothing (Vote II.), Shipbuilding (Vote VIII.), and Naval Armaments (Vote IX.).

The numbers required for manning the Fleet are 3000 more than were asked for in the Estimates for the current year. This increase is due mainly to the requirements of new ships now being placed in commission and under construction.

The increase of £122,000 in Vote I. and of £118,500 in Vote II. is due chiefly to the pay, food, and clothing required for the additional *personnel*, but in the case of Vote II. is partly accounted for by higher prices.

The shipbuilding and armament votes (Votes VIII. and IX.) together show a very large total, caused mainly by the amount required to complete the old programmes already approved by Parliament. The increase over last year is three and a quarter millions.

Vote X. shows an increase of £70,000. The important new works at Rosyth and Portsmouth have reached a stage of development at which the contractors must earn larger sums if they are to complete them within the contract time. No new works of great magnitude are proposed for the coming year, but a second dock has been ordered at Rosyth.

The annuity in repayment of loans under the Naval Works Acts remains at the same total as in 1910–11, the balance of the funds placed at the disposal of the Admiralty under those Acts having been expended in 1908–9.

The expansion of the Fleet inevitably increases the miscellaneous charges, such as Travelling, etc., falling upon Vote XI., and under this Vote provision has also been made for the estimated expenditure from Naval Funds in connection with the celebration of the Coronation of His Majesty the King.

The increases under Votes XII., XIII., XIV., and XV. are automatic, the non-effective charge being increased by £27,600.

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Shipbuilding.

New construction will cost £15,063,877, as against £13,279,830 for 1910–11. Of this amount £13,3235,22 will be spent on the continuation of work on the ships already under construction, and £1,738,645 for beginning work on ships of the new programme, which is composed as follows:—

5 Large Armoured Ships,
3 Protected Cruisers,
1 Unarmoured Cruiser,
20 Destroyers,
6 Submarines,
2 River Gunboats,
a Depôt Ship for destroyers, and a
Hospital Ship.

Between April 1st, 1910, and March 31st, 1911, the following ships will have been completed and become available for service:—

1 Battleship (Neptune).
1 Armoured Cruiser (Indefatigable).
5 Protected Cruisers (Bristol, Glasgow, Gloucester, Liverpool, Newcastle).
1 Unarmoured Cruiser (Blanche).
28 Torpedo Boat Destroyers (Viking, Beagle, Bulldog, Foxhound, Grasshopper, Mosquito, Scorpion, Renard, Wolverine, Racoon, Harpy, Basilisk, Savage, Pincher, Rattlesnake, Scourge, Acorn, Cameleon, Lyra, Redpole, Comet, Larne, Goldfinch, Alarm, Rifleman, Hope, Nemesis, Martin).
3 Submarines (C 33, C 34, D 2.

On April 1st, 1911, there will be under construction:—

10 Battleships.
3 Armoured Cruisers.
7 Protected Cruisers.
3 Unarmoured Cruisers.
32 Torpedo Boat Destroyers.
12 Submarines.

Of these, the following are expected to be completed by the end of the financial year 1911–12:—6 battleships, 2 armoured cruisers, 4 protected cruisers, 2 unarmoured cruisers, 29 destroyers, and 6 submarines.

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The two floating docks for Portsmouth and the Medway, ordered from Messrs. Cammell Laird & Co. and Messrs. Swan, Hunter & Co., respectively, will also be complete by the end of the financial year 1911–12.

In addition there will be under construction on April 1st, 1911, for Dominion governments, two armoured cruisers, two protected cruisers, and two submarines.

The labour troubles which occurred in 1910 delayed to some extent the progress of many of the ships building, but it is expected that nearly all the vessels affected will be completed by their contract dates.

As a result of the consideration of the workmen's petitions for 1910, increased rates of pay have been granted to skilled labourers and wood caulkers in the dockyards.

Administration.

A committee has been appointed, with Sir James L. Mackay, G.C.M.G., K.C.S.I., K.C.I.E., as Chairman, to enquire into, and report on, the numbers and organisation of the Royal Corps of Naval Constructors, and certain cognate questions.

It has not yet been found possible to give effect to all the recommendations of the Committee on the Writing Staff of the Dockyards, and the financial questions involved are still under consideration.

The establishment for workmen in His Majesty's dockyards has been re-opened, and the number of established men has been fixed at 6,500.

The arrangements have now been completed for the transfer of the staff from Woolwich to the new torpedo factory at Greenock, and every endeavour is being made to find government employment for the men who refused to transfer, and whose discharge was thereby rendered necessary.

Sir William H. M. Christie, K.C.B., F.R.S., who has filled the position of Astronomer Royal with distinction for over 29 years, has been succeeded by Mr. F. W. Dyson, F.R.S., Astronomer Royal for Scotland.

Effect has already been given to many of the recommendations of the committee appointed to enquire into the Naval Medical Service, but others of them are complicated by financial issues which remain for settlement.

I have for some time past been giving my most earnest consideration to the serious problem of tuberculosis so far as it affects

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the seamen of the Royal Navy. I have caused an investigation to be made by the Medical Consultative Board into the means by which, under the conditions peculiar to the Naval Service, this disease can best be treated, and its inception and spread checked.

Personnel.

The scales for full and half pay for accountant officers have been revised. The principal change introduced is the increase of pay in the junior ranks so as to place the younger officers more on an equality with officers of the same age in other branches of the Service.

In continuation of the regulations laid down for the training of midshipmen entered under the new scheme, which were issued in May, 1908, further instructions have been promulgated with a view to securing greater general uniformity. The first group of officers entered under the new scheme will, on passing the necessary examination, attain the rank of sub-lieutenant in May next.

To meet the requirements of the Service, the establishment of Warrant Officers has been increased by 90.

As the seniority of the Artificer Engineers at the head of the list rises, steps will be taken to increase the number of Chief Artificer Engineers within the limits already authorised. During the last financial year ten Artificer Engineers were advanced to chief rank, an increase of four over the preceding year.

As foreshadowed in 1905, the new ranks of Warrant Mechanician (Warrant Officer) and Commissioned Mechanician (Commissioned Warrant Officer) have been instituted, and five mechanicians have been promoted to warrant rank. Candidates for the new warrant rank sat for the same examination as that taken by candidates for the rank of Artificer Engineer, and the result was very satisfactory. The number of Warrant Mechanicians will be gradually increased until a sufficient number has been obtained, and promotions to Commissioned Mechanism will be made in due course.

In continuation of the policy of extending the opportunity of obtaining warrant rank beyond those classes of naval ratings to which hitherto this privilege has been restricted, warrant rank has now been introduced for the armourer and electrician branches, and the rank of Commissioned Warrant Officer has also been established for the latter. The opportunity has also been taken to assimilate the service qualification for the advancement of electricians to the rating of Chief Electrician to that in force for Engine Room Artificers.

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A new warrant rank for the Royal Marines has been created with the title of Gunnery Sergeant-Major, R.M. Twenty of these Warrant Officers will be created, and candidates for the rank have been selected, and are at present undergoing a qualifying course. These officers will serve mainly afloat, and their duties will be analogous to those of Gunners, R.N., with whom they will rank; they will also receive the same pay.

Arrangements have been made with civil hospitals for the supply, in the event of war, of trained nurses, who will form a reserve of additional trained nurses. The new force will be known as Queen Alexandra's Royal Naval Nursing Service Reserve.

The system of detention as a form of punishment for offences under the Naval Discipline Act came into force on the Home and Mediterranean Stations on January 1st, 1911. On other foreign stations it will come into force on April 1st next. Satisfactory progress is being made with the building of detention quarters at the three Home ports, and until they are ready good use is being made of the temporary accommodation available. So far as can be seen at present, there is every reason to believe that the change will be beneficial to the Service and to the men. Not only is the stigma of imprisonment removed, but the courses of drill and training through which the men are put have been carefully designed to make them more efficient as naval ratings. The development of the scheme is receiving close attention. Consequent on the change, the naval prisons at Portsmouth and Lewes have been closed. Bodmin is now the only naval prison.

It is satisfactory to note that the number of punishments inflicted under the Naval Discipline Act continues to diminish without in any way impairing that high standard of discipline which is one of the best traditions of His Majesty's Navy.

Having regard to the important changes introduced in the messing arrangements of the Fleet, and the increased responsibility thrown upon ship's steward ratings in recent years, the pay and prospects of that class could no longer be regarded as adequate in comparison with other branches of naval ratings. An improved scale of pay has therefore been introduced for the class, to take effect from January 1st, 1911, and a new petty officer rating has been established with the title of Second Ship's Steward.

The pay of the painter and plumber classes has also been under review. As the scale in force for these classes was insufficient to attract recruits of the standard required, and compared unfavourably with the rates of pay of other classes of naval ratings, an improved scale of pay for painter and plumber ratings has been sanctioned.

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H.M.S. President will cease to act as a drillship for the Royal Naval Reserve on the 31st of this month, and part of her duties will be transferred to H.M.S. Buzzard, the drillship of the London Division of the Royal Naval Volunteer Reserve, which will be renamed the President.

Arrangements have been made with the Central Labour Exchange by which the notices of the provincial exchanges are displayed at the various recruiting offices, and, reciprocally, recruiting posters for the Royal Navy and Royal Marines are exhibited at the labour exchange offices.

Satisfactory results have been obtained from the tentative arrangements made with the Navy Employment Agency towards the latter part of 1909, by which, in consideration of an annual grant of £1000 for three years from naval funds, the agency undertook, with the co-operation of recruiting officers and the divisional officers of Coast-guard, to extend the scope of its work in finding civil employment for naval and marine reservists. The progress of a scheme of this nature, extending as it does over the United Kingdom, must be gradual; but reports indicate that within a little over a year the agency has placed in permanent positions some 40 per cent. more men than in the previous year.

Works.

During the last year the main works of Simon's Bay Dockyard have been completed, and were formally opened by His Royal Highness the Duke of Connaught during his recent visit to South Africa.

At Plymouth the whole of the works in connection with the Keyham Dockyard extension are practically finished, whilst at Portsmouth the new lock and dock are progressing satisfactorily.

Good progress is also being made with the naval base at Rosyth.

Declaration of London.

The inter-departmental committee under the presidency of Lord Gorell, on which the Admiralty was represented, have completed part of the enquiry with which they were charged. A Naval Prize Bill, incorporating the unanimous recommendations of the Committee and designed to bring existing legislation into accord with the provisions of the Convention for the establishment of an International Court of Appeal in Prize cases and of the Declaration of London, was printed and introduced in the last Parliament.

Dominion Naval Forces.

Certain questions affecting the administration and organisation of the Dominion naval forces on the basis of the scheme outlined at the

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Imperial Conference in 1909, have been discussed with the Dominion Governments, and I hope that many of the details may be settled before the meeting of the Imperial Conference in May next. With regard to the agreement arrived at with representatives of the Australian Government at the Defence Conference in 1909, the Commonwealth Government have decided not to ask for any contribution from Imperial funds towards the maintenance of the Australian naval unit. An expression of the cordial thanks of the Board of Admiralty has been conveyed, through the Colonial Office, to the Commonwealth Government for the additional relief which will thus be given to Naval Votes when the Australian naval force is established.

The Commonwealth Government of Australia have secured the services of Admiral Sir Reginald Henderson, K.C.B., and three other officers of the Royal Navy, to advise them as to the best manner of organising their naval forces.

The Canadian Government have completed the purchase of the cruisers Niobe and Rainbow, to which I referred in my Statement last year, and these vessels are now in commission on the Atlantic and Pacific seaboards respectively of the Dominion. Both cruisers were manned mainly by officers and men lent from the Royal Navy and the Royal Fleet Reserve.

Distribution of the Fleet.

The organisation of the various fleets and squadrons has remained unchanged, but the strength of the Home Fleet has been increased, mainly by the substitution of new for older vessels, especially in the First Division and in the First and Second Destroyer Flotillas.

Throughout the year the Commanders-in-Chief have performed tactical and other exercises with the ships under their orders. The Home and Atlantic Fleets proceeded to Scottish waters in April last, where they engaged in various exercises. The annual manœuvres were carried out in July last by the Home Fleet (including the Third and part of the Fourth Division), the Mediterranean and Atlantic Fleets, and the Fourth Cruiser Squadron.

The Home, Mediterranean, and Atlantic Fleets met for combined exercises off the north-west coast of Spain in January of this year, and by the courtesy of the Spanish Government visited several Spanish ports and received a very hearty welcome.

Owing to the death of His late Majesty King Edward VII., His Majesty's ships were prevented from accepting the invitation of Argentina and Chile to attend their centenary celebrations. The Fourth Cruiser Squadron, however, paid a special visit to Argentine

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waters in the autumn of last year, and the Rear-Admiral Commanding, and his officers and men, were received with marked hospitality. The squadron also visited the ports of Uruguay and Brazil on the return voyage.

His Majesty's ships Kent and Challenger are now on their way to Valparaiso to pay the postponed visit of ceremony to Chile, and will subsequently proceed in company to the ports of other South and Central American Republics.

The ships of the East Indies Squadron, specially reinforced for the purpose, have now for a considerable time been engaged in the suppression of the arms traffic between the Arabian and Persian littorals. The operations, carried out under arduous conditions, have led to more than one engagement and to some loss of life, but have attained a decided measure of success.

The United States Atlantic Fleet visited England and France in the last months of 1910, and Portland and Gravesend were each visited by two of its divisions in turn. At the former port they were welcomed by the Home Fleet, and relations between officers and men of the two fleets were most cordial. His Majesty's Government were glad of the opportunity of entertaining some of the principal officers in London at a luncheon at the House of Commons.

I append the usual record of work done by the Department during the past year.

REGINALD MCKENNA.

1*st March*, 1911.

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STATEMENT OF WORK, &c., 1910-11.

Changes in the Composition of the Fleets.

Home Fleet.

The first division will revert to its previous constitution of eight battleships and five armoured cruisers when the Neptune and Indefatigable join the Fleet. Four protected cruisers of the Bristol class have replaced four cruisers of the Talbot class in the first and second divisions. The addition of new destroyers has led to extensive changes in the composition of all the five destroyer flotillas in the Home Fleet.

Atlantic and Mediterranean Fleets (including Fifth and Sixth Cruiser Squadrons).

No changes have been made during the year in the composition of these fleets. The Amethyst and Dwarf, which are affiliated to the Atlantic Fleet, have been employed on the East Coast of South America and the West Coast of Africa respectively.

Fourth Cruiser Squadron.

As in former years the Melpomene and Scylla have been engaged on duties in the West Indies and on the East Coast of Central America. The Brilliant has been employed in Newfoundland waters during the fishery season, and latterly has been cruising in the West Indies.

China.

The armoured cruiser Bedford, which was wrecked in August, 1910, has been replaced by the protected cruiser Newcastle. Three submarines of the C class are being added to the squadron, and will be stationed at Hong Kong.

Australia and Cape of Good Hope.

The composition of these squadrons has remained unaltered.

East Indies.

The suppression of the arms traffic in the Persian Gulf has employed most of the vessels of this squadron, which was reinforced for the purpose in the spring of last year. H.M.S. Highflyer will shortly relieve H.M.S. Hyacinth as flagship on the station. The sloop Espiègle has replaced the gunboat Lapwing.

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West Coast of America.

The Shearwater and Algerine again carried out cruises to various ports in North and South America. The Behring Sea patrol was carried out by the Algerine.

Cadets' Training Ships.

The Cornwall and Cumberland continue to be employed on this service; their cruises have included visits to North American and to Mediterranean waters.

Coast-guard and Fishery Service Vessels.

No alteration has been made in these vessels.

PERSONNEL.

Officers.

Authority has been obtained for the payment of an allowance of 15*s.* a day, in addition to half pay, together with lodging allowance. to flag officers undergoing gunnery, torpedo and signal courses, Formerly flag officers appointed for these courses received half pay only.

The scales of full and half pay for accountant officers have been revised, and special allowances for Secretaries have been instituted. An allowance of 2*s.* 6*d.* a day has been granted to the senior Secretary's Clerk in the offices of Commanders-in-Chief or of Flag officers in the more important independent commands.

An advanced course of training has been laid down for a limited number of candidates for the rank of Gunner so as to fit them for assisting the gunnery lieutenants in charge of fire control, and thus afford those officers the relief required in the larger ships of the Fleet. Those who successfully pass the advanced course will have a distinguishing mark placed against their names in the Navy list.

The officers required for the Niobe and Rainbow have been lent to the Canadian Government, and, while serving in those vessels, will count their service as though it were in a ship of war of the Imperial Navy. Officers have also been lent to Canada for duty at headquarters and at the naval establishment at Halifax.

Three lieutenants and two surgeons of the Royal Navy are serving with the Antarctic expedition, under the command of Captain R. F. Scott, C.V.O., R.N.

At the request of the Government of the Commonwealth of Australia, a lieutenant has been lent for service with the Commonwealth destroyers for a period of two years.

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In view of the institution of a Naval Airship Service it has been decided to extend the scale of daily extra pay in force for the crews of submarines to the officers and men employed in naval aircraft.

Men.

It has been decided that it is desirable for the efficient organisation of the communications of a fleet that the work of the signal and wireless telegraph branches in a ship should be co-ordinated under one head. Instructions have accordingly been issued vesting the control of all signalling, visual and wireless, in the signal lieutenant, signal boatswain or senior signal rating of the ship, who will be responsible for the transmission and receipt of all signals and for the correct distribution of information received. To give effect to this arrangement courses of instruction in general knowledge of wireless telegraphy have been instituted for signal lieutenants, signal boatswains, chief yeomen and yeomen of signals. At the same time every effort is being made to develop the wireless organisation on board ship by training young signalmen to take a share of the work in the wireless room, and securing so far as possible an interchange of duties between the wireless and signal staffs.

In order that the educational advantages with seamen class Boys receive during their time in the training service may not be wasted when they go to sea, instructions have been issued to the Fleet that so far as circumstances admit, Boys 1st class and Ordinary Seamen, who have been in the advanced class, shall be afforded facilities for utilising and extending to the best practical advantage the knowledge which they have obtained from their early training.

As the numbers of Coast-guardsmen have reached the limit at which it has been decided that the establishment of that force shall be maintained, transfers from the Service afloat have been resumed after a suspension of five years.

After a suspension of entries in the writer and ship's steward branches for a period of about five years, two examinations open to public competition have been held in 1910 for the entry of third writers and ship's steward's assistants. The scheme of examination has been reviewed and certain changes made in the scope of the papers, which have been standardised and prepared at the Admiralty.

The Emerald, late receiving ship at Queenstown, has been refitted and attached to the Devonport harbour training service as Impregnable III. At the same time it has been approved to erect an additional block of dormitories at the naval barracks at Shotley, affording accommodation for about 160 more boys.

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In pursuance of the arrangements foreshadowed in last year's report, the training of the boy artificers at Chatham was transferred to Devonport in July and at the same time the mechanicians' training was transferred from Devonport to Chatham. The changes were carried out with the least possible disturbance of classes and the new arrangements are working satisfactorily. Certain small improvements have been introduced in the curriculum of the boy artificers. Satisfactory reports continue to be received both of the establishments themselves and of the progress and ability of the engine-room artificers rated up from boy artificers and also of the mechanicians.

The system under which a certain number of Marines who volunteer are given a course of instruction in naval signalling with a view to their employment on local service in time of emergency has been extended.

In consequence of the increased use of oil fuel and turbine machinery, advantage is being taken of the facilities in the shore establishments for affording preliminary instruction in these subjects to officers and men of the engine-room department who will be sent to ships so fitted. The supply of engine-room ranks and ratings trained in oil fuel in these establishments is supplemented by passing further numbers through courses of instruction at sea on board ships fitted with oil fuel appliances.

In recognition of the extra work and responsibility which devolves upon them, an allowance of 1s. a day has been instituted for the senior writers in the offices of the Commanders-in-Chief at the Home ports and the Commander-in-Chief of the Home Fleet.

During the year progress has been made with the preliminary arrangements for the establishment of a Canadian Naval Service. The nucleus of a Naval service has been formed by the completion of H.M.C.S. Niobe and Rainbow as instructional establishments, the manning of them being effected chiefly by volunteers from the active service, the Royal Fleet Reserve, and pensioners, under special conditions which have been arranged with the Canadian Government.

The system of training Imperial Australasian ratings in England under the agreement of 1902 is being continued.

On the arrival of the crews sent from Australia to take out the Commonwealth destroyers Yarra and Parramatta, built in England, the opportunity was taken to arrange for the officers and men of the Commonwealth Naval forces to undergo special courses of instruction at Portsmouth during the interval between their arrival in England and their embarkation in their ships.

The crews of these vessels were supplemented for the voyage out

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to Australia by the loan of Imperial ratings on passage to join H.M. ships on that station.

During the financial year 1909–10, 9841 Naval ratings and 1021 Marines were recruited from the shore through the various recruiting agencies. No difficulty was experienced during the year in completing the full requirements of all ratings, except painters. Recruiting for stokers was particularly good, and early in the year it was found necessary to raise the standard of physical requirements in order to check the rate of entry. There was also no lack of candidates for seaman class Boys and Youths, notwithstanding that the physical standard for entry was raised for the greater part of the year. During 1910–11 the system of newspaper advertisements was extended, and additional Petty Officer Recruiters were attached to the Chatham and Portsmouth Royal Naval recruiting districts. Six additional non-commissioned officers have also been added to Royal Marine recruiting districts. Up to the present these measures have yielded very satisfactory results, and it is not anticipated that any difficulty will be experienced in recruiting the numbers required.

When H.M.S. President ceases to act as a drillship for the Royal Naval Reserve on the 31st of this month, the area hitherto recruited by the ship and coinciding with the East London Postal District will become a separate naval recruiting district. The new district will be in the charge of a retired naval lieutenant, who will have three petty officer recruiters working under him. The details of the scheme are now being arranged.

As the general duties of the Coast-guard under existing conditions do not admit of their carrying out recruiting work at long distances from their centres, it has been arranged that the area assigned to the Coast-guard for recruiting purposes, which has hitherto extended from 10 to 15 miles from the coast line, shall be limited to a distance of five miles from the coast. The area thus set free, and also certain large towns within the five-mile limit, will in future be recruited by the regular staff of Naval and Marine recruiters. In the latter case the Coast-guard are authorised to act as "bringers"—that is, they may raise candidates for final examination and entry, sharing with the Naval or Marine recruiting staff who carry out the latter duty the gratuity which is allowed for each candidate finally entered in His Majesty's Service.

A new edition of the illustrated pamphlet, "How to join the Royal Navy," has been prepared and distributed for issue to the public, to all recruiting officers, and to all post offices throughout the United Kingdom.

The pamphlet issued gratuitously to ex-Naval men and ex-Marines

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as a guide to the best way of seeking employment in civil life has been revised and enlarged.

The regulations for the harbour training service have also been revised and a new edition printed. The revision of the handbook of physical training, volumes I. and II., has been completed, and both volumes issued to the Fleet and placed on sale to the public.

Satisfactory progress has been made with the development of the revised victualling and canteen arrangements in the Fleet; and the reports received show conclusively that both systems are working well.

The general mess system continues to work satisfactorily. Since the report of last year, the system has been extended to the stoker training establishment at Chatham, and its further extension to the corresponding establishment at Devonport has recently been under consideration.

Royal Fleet Reserve.

The total numbers of the Royal Fleet Reserve have increased from 20,813 to 21,943, the distribution of these numbers on December 31st, 1910, being as follows:—

	Class A.	Class B.	Total.
Seamen and Naval Police . .	3,488	8,023	11,511
Stokers	1,664	3,706	5,370
Marines	1,738	3,324	5,062
	6,890	15,053	21,943

The increase in Class A amounted to 330, and in Class B to 800.

In view of the numerical strength now attained, the practice of allowing a reduction in the ordinary rates of purchase-money to continuous service men who are transferred direct from the active service to the reserve has been discontinued. These men will in future be required to pay the full rates prescribed by the regulations, and no refund of purchase-money will be granted to men who enrol in the reserve after discharge from the active service.

The minimum period of service qualifying men in the Royal Navy or Royal Marines for enrolment in the Royal Fleet Reserve has been raised from four to five years.

To simplify the performance of annual training by members of the Royal Fleet Reserve, a new system has been instituted whereby reserve men are required to perform a week's drill by December 31st

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in each year, in place of the old "drill year" system, which has proved cumbrous and complicated.

Arrangements have also been made for payment of retainers to Class B Royal Fleet Reserve men to be made on the first instead of the fifteenth day of each quarter.

Special efforts have been made to ensure that all Royal Fleet Reserve drills are efficiently carried out, and that the training is of a useful character

Royal Marines.

The numbers borne on March 31st, 1911, will be about 15,800. There will also be about 1300 band ranks afloat and under training.

The courses of instruction which the junior Marine officers have received at the Royal Naval College, Greenwich, during the last twelve months have proved of value to the Corps, and the examination results have been entirely satisfactory.

The number of re-engaged men now serving to complete time for pension is 4115, as compared with 3792 last year.

The arrangements for the centralisation of the training of Naval bands at Eastney have been completed. The permanent administration and instructional staff of the school has been reorganised and a revised scale of allowances established.

The numbers of Royal Marines qualified in the higher gunnery ratings are as follows:—

Gunlayers, 1st class	75
Gunlayers, 2nd class	358
Gunlayers, 3rd class	496

The re-arming and re-equipping of the corps with the short rifle and new pattern woven web and brown leather bandolier equipments, begun last year, is being proceeded with.

The improvements in the sanitary arrangements of the several Royal Marine barracks are approaching completion, and a band practice hall has been erected at the Royal Naval School of Music.

Coast-guard.

The numbers borne on January 1st, 1911, were:—

District Captains, District Paymasters and Staff.	35
Divisional Officers	78
Chief Officers and Men	2,921
	3,034

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The titles of Coast-guard ratings have been altered as follows:—

Old Title.	Present Title.
Chief Boatman in Charge.	Chief Petty Officer, Coast-guard.
Chief Boatman.	Petty Officer, Coast-guard.
Commissioned Boatman (rated before October 1st, 1907).	Second Class Petty Officer, Coast-guard.
Commissioned Boatman (rated after September 30th, 1907).	Leading Boatman.

The titles of Chief Officer and Boatman remain.

H.M.S. President and H.M.S. Eagle will be paid off on March 31st, 1911, by which date all Royal Naval Reserve officers and men will have come under the new system of training in sea-going ships of the Home Fleet.

A fishery cruiser of the Trawler type is being built and is to be completed for service about the end of May, 1911.

The vessels employed on North Sea Fishery Protection duty have, at the request of the Board of Agriculture and Fisheries, afforded assistance to that department in obtaining data for the English portion of the work of International Investigations of the Sea.

The efficiency of the signal section continues to improve. This is largely accounted for by the institution of classes for signal section ratings in the signal schools.

The examination for promotion to the rank of Chief Officer has been revised, and a higher standard is now required.

Royal Naval Reserve.

The strength of the Royal Naval Reserve (Home) on January 1st, 1911, was:—

Executive Officers	1,319
Commissioned Engineer Officers . . .	221
Warrant Engineers	120
Engine Room Artificers	515
Seaman Ratings	11,008
Stoker Ratings	5,377

Of the above Executive Officers 548 have undergone 12 months' training in the Fleet and are in receipt of training fees. In addition to these, 65 are now undergoing this training.

The following numbers have performed courses of instruction,

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drill, and training during the 12 months ended December 31st, 1910:—

	Short Courses.		New System.		Old System.
	Gunnery and Torpedo.	Signal.	Three Months' Training Afloat.	Annual or Biennial Training.	Drill.
Executive Officers	140	16	—	213	291
Warrant Engineers	—	—	24	—	—
Engine-room Artificers . . .	—	—	172	—	—
Seamen ratings .	—	—	910	3,391	2,026
Stoker ratings .	—	—	569	2,226	150

The training under the new system continues to be carried out on board ships of the Home Fleet, and the reports on the Royal Naval Reserve men under training made by the commanding officers of these ships are generally very satisfactory.

Considerable progress has been made with the organisation of the trawler section of the Royal Naval Reserve. Regulations for the entry, training, pay and employment of officers and men have been printed and issued, and preparations have been made for the entry and training of the numbers authorised for the current financial year.

The institution of the Decoration for officers and the Long Service and Good Conduct Medal for men has been much appreciated, and the Decoration and Medal have been awarded to a large number of officers and men respectively.

Royal Naval Volunteer Reserve.

The strength of the Force is now six divisions, comprising 43 companies, the actual numbers being:—

Royal Naval Volunteers.	Establishment.	Strength, Jan. 1st, 1911.
Officers	190	160
Honorary Officers	—	20
Petty officers and men . . .	4,220	3,848
Permanent Staff—		
Officers	7	7
Petty Officers and men . . .	69	69

During the current financial year the following numbers have embarked for training afloat for 14 or 28 days in fully-manned ships of the Home Fleet:—

Officers	42
Petty Officers and men	1,111

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These embarkations continue to prove most popular, especially as they are now carried out in fully-manned ships where the volunteers, from their association with active service ratings, gain the experience that will add materially to their value in war as an adjunct to the Navy.

Officers and men have also undergone courses at the various schools in gunnery, torpedo, signalling and telegraphy during the year, and the following have passed and obtained certificates:—

——	Gunnery.	Torpedo.	Signalling and Telegraphy.	Total.
Officers	35	4	—	39
Petty Officers and men . .	50	10	6	66

Three Medical Officers have undergone a fourteen days' course at Haslar Hospital.

The reports on officers and men embarked or under instruction in the schools have been most satisfactory.

The attention paid to instruction of the Royal Naval Volunteer Reserve in signalling has had satisfactory results, and there are now 212 signal ratings.

Greenwich Hospital.

Northern Estates.

All the farms are let and the revenue from all sources is likely to be maintained. Every effort is being made to develop the latent mineral resources on these estates.

Greenwich Estate.

The return continues to show a steady increase, and the policy of carrying out improvements is being steadily pursued as opportunities occur.

Royal Hospital School.

The standard of efficiency is maintained and the grants earned were at the highest possible rate. One hundred and ninety-two boys were drafted into the public service during the year.

Painted Hall.

The repairs to the roof of the hall have been completed, and the work of strengthening the dome is in hand. It has been found necessary to renew the pavement and to close the hall to the public temporarily during the progress of the work.

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Chapel.

Several stained glass windows have recently been placed in the chapel, by private subscription, in memory of distinguished naval officers.

ORDNANCE.

Guns.

The manufacture of guns is proceeding at a sufficient rate to meet the requirements for ships building.

Ammunition.

The authorised reserves of ammunition have been fully maintained.

Advance continues to be made in designs of all natures of projectiles.

Cordite.

Certain difficulties which arose in connection with the supply of cordite early in the year have been overcome.

Small Arms.

Short rifles have been supplied to the Royal Marines on shore, and to Royal Marines afloat in the Home, Atlantic and Mediterranean Fleets. It is expected that complete supply to the Royal Marines afloat will be made during the financial year 1911–12.

The older marks of short rifles are being brought up to date as far as possible to include the improvements embodied in the latest pattern rifle.

Gun Machinery.

The manufacture of the 13·5-in. gun machinery for the Orion and Lion classes has proceeded satisfactorily during the past year, and it is anticipated the turrets for Orion and Lion will be in position in the ships before the end of the present financial year. The trials of the first mountings have taken place with satisfactory results.

Hand-worked Mountings.

The mechanism of hand-worked mountings has been progressively developed towards obtaining increased rate of fire and economy of labour.

Gunnery Practices.

The rules for the annual tests of gunlayers were revised at the beginning of 1910, and have proved to be an advance on those

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previously in force. The rules for 1911 have been amended in some particulars, the same general principles being retained.

Torpedoes.

Satisfactory progress has been made in the supply to the Fleet of the improved torpedo referred to last year.

Wireless Telegraphy.

Several small improvements have been made in the wireless apparatus of ships, which has led to increased efficiency.

Additional shore stations have been commenced and should be completed by next autumn.

Inspection and Proof.

The inspection of ordnance stores carried out at contractors' works is proceeding in accordance with arrangements which have been made, and considerable advantages are anticipated on the completion of the testing house, which is in course of erection at Sheffield.

Ordnance and Torpedo Depôts.

The Torpedo factory at Greenock has been opened and the work of manufacture has begun. The factory at Woolwich will be closed on March 31, 1911.

FLEET COALING SERVICE.

Steam Vessel Coals.

Progress continues to be made in improving and adding to the facilities for coaling the Fleet with despatch and economy.

Considerable progress has been made in connection with the coaling scheme on shore at Devonport, and the machinery should be installed and in full working order during the course of 1911.

Two large hulks, each of about 10,000 tons, are also being equipped with modern coal handling appliances, and will be available for service early in the year.

The colliers specially engaged by the Admiralty on continuous charter have proved very suitable for fleet work, and some excellent coaling performances have been made by H.M. ships in coaling from them.

Oil Fuel and Petrol.

Additions have been and are being made to the Admiralty tank installations for the storage of oil fuel and petrol to meet the growing expenditure of these fuels to the Navy.

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The new Fleet Auxiliary (SS. Burma) for the conveyance of oil fuel to the Fleet is expected to be ready for service early in 1911–12.

The new petrol carrier, Royal Fleet Auxiliary Isla, has been employed in attendance on the submarine flotillas throughout the year and has rendered valuable service.

NEW CONSTRUCTION.

The battleship Orion, which was laid down at Portsmouth on November 29, 1909, was launched on August 20, 1910, and the armoured cruiser Lion, laid down at Devonport on November 29, 1909, was launched on August 6, 1910. Substantial progress has been made during the current year on both ships, and it is expected that they will be completed within a period of two years from the date of laying down. Good progress is also being made with the four contingent ships of the 1909–10 programme, the Conqueror, Monarch, Thunderer, and Princess Royal.

The protected cruisers Falmouth, Weymouth, and Dartmouth were launched on September 20, 1910, November 18, 1910, and February 14, 1911, respectively, and good progress is being made on them, as well as on the sister ship Yarmouth.

The unarmoured cruiser Blanche, laid down at Pembroke on April 12, 1909, has satisfactorily carried out all her steam trials and is now in commission. The sister ship Blonde, laid down on December 6, 1909, and launched on July 22, 1910, is now at the steam trial stage.

Several of the 20 destroyers of the Acorn class ordered in 1909–10 have been delivered.

Four submarine boats of the D class, Nos. 3, 4, 5 and 6, being built by contract, are well advanced.

Submarine boats C 33 and C 34, which were built and engined by Chatham Yard, were completed on August 13, 1910, and September 17, 1910, respectively, and have joined the submarine flotilla. The two submarine boats of D type under construction at Chatham will, it is anticipated, be completed in the early months of 1911–12.

The following fighting vessels were provided for in the programme for the present financial year, and orders have been placed for the whole of them.

Battleships (4).

King George V., Ajax, Centurion, Audacious.

Armoured Cruiser (1).

(Name not yet given.)

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Protected Cruisers (3).

Chatham, Southampton, Dublin.

Unarmoured Cruisers (2).

Active, Amphion.

Torpedo-Boat Destroyers (23).

Acheron, Archer, Ariel, Attack, Badger, Beaver, Defender, Druid, Ferret, Forester, Goshawk, Hind, Hornet, Hydra, Jackal, Lapwing, Lizard, Phœnix, Sandfly, Tigress, and three others not yet named.

Submarines (6).

Of the foregoing vessels, the battleships King George V. and Centurion were laid down at Portsmouth and Devonport respectively on January 16, 1911, the Ajax was laid down at Messrs. Scott's works at Greenock on February 27, 1911, and preparations for building the sister ship Audacious are well advanced at Messrs. Cammell Laird's yard at Birkenhead. The order for the armoured cruiser has been placed provisionally with Messrs. Palmer's Shipbuilding Company.

The two armoured cruisers Australia and New Zealand for the governments of the Commonwealth of Australia and New Zealand are well advanced at the works of Messrs. John Brown and the Fairfield Company respectively, and are to be completed in September, 1912.

The protected cruiser Chatham was laid down at Chatham Yard on January 3, 1911, and her sister vessels Dublin and Southampton have been ordered from Messrs. Beardmore and Messrs. John Brown respectively. Two more ships of this class have been ordered from Messrs. Cammell Laird and the London and Glasgow Company for the Commonwealth of Australia, and named Melbourne and Sydney respectively. Drawings and specifications have been supplied to the Canadian Government for use in calling for tenders for four vessels of this class.

The Active, unarmoured cruiser of the improved Boadicea type, which was laid down at Pembroke in July, 1910, will be launched on March 14, 1911, and will be followed on the same slip by the sister ship Amphion.

The 20 vessels of the new Acorn class have been ordered by contract and good progress is being made with them. The three additional vessels included in the 1910–11 Estimates have recently been ordered.

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Two submarines were laid down at Chatham Dockyard on February 14, and an order for four more has been placed with Messrs. Vickers. Two similar boats have also been provisionally ordered for the Australian Commonwealth.

Fleet Auxiliaries, &c.

A depôt ship for submarines has been ordered from Messrs. Scott, of Greenock, and named Maidstone; and two tenders from Messrs. Cammell Laird, named Alecto and Adamant.

The oil tank steamer Burma, now being built by the Greenock and Grangemouth Dock Company, is well advanced.

A coast-guard and fishery cruiser, to be named Watchful, has been ordered from Messrs. Hall, Russell and Co., of Aberdeen.

Tenders are under consideration for a surveying vessel to replace Egeria.

A steel water tank and salvage vessel for submarines has been ordered from Messrs. Vickers for delivery during the financial year 1911–12.

Orders for two floating docks have been placed provisionally with Messrs. Swan, Hunter and Co.

Tugs, Lighters, &c.

The following tugs and other small vessels have been completed:—

Hellespont, paddle tug, for Haulbowline.

Firm, paddle tug, for Sheerness.

Alliance, twin screw tug, for Sheerness.

Resource, mooring steamer, for Portsmouth.

Supply and Urgent, two water tank vessels, for Plymouth and Sheerness respectively.

Two victualling lighters for Plymouth, and a mooring and salvage lighter for Sheerness.

One ammunition and store barge.

One lighter, for Ascension. One steam ash hopper barge, for Dover.

One mooring lighter, for Sheerness, is in hand.

Vessels being converted for various Services.

Naiad and Intrepid have been completed for service as mine-layers.

Rosario is being converted into a submarine depôt ship.

MACHINERY AND BOILERS.

All war vessels completed during the present year and at present under construction have been designed with water-tube boilers and

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turbine engines, the latter being either of the Parsons or of the Brown-Curtis type. This latter design was first installed in the second-class cruiser Bristol in association with the superheaters at the boilers, and satisfactory results were obtained on the contractors' trials.

So far as can be arranged, interchangeability of the auxiliary machinery and separate parts of the main machinery is being provided for in vessels of the same type, thus following previous practice.

Additional machines have been added to the equipment of Assistance and Cyclops, enabling them still further to deal with repairs which otherwise would have required dockyard assistance.

Magazine cooling plant has been fitted in all vessels completed or at present under construction.

The boilers of all armoured vessels building are being fitted to burn oil in conjunction with coal, the full power being obtainable in these vessels by the use of coal only. Satisfactory full-power trials have been carried out in the second-class cruisers of the Bristol class and Blanche, the boilers of which vessels are designed to burn oil in conjunction with coal when obtaining full power.

The torpedo-boat destroyers of this year's programme are designed to burn oil only, and improvements have been made in the oil burning fittings.

Experiments have been made, and are still in progress, at Haslar, to reduce the excessive amount of smoke produced when burning bituminous coal in the furnaces of water-tube boilers; a substantial reduction has already been effected.

Internal Combustion Engines.

Valuable experience with the oil-driven dynamo engines fitted in H.M. ships has been obtained, and the results are being closely watched.

The initial difficulties experienced with the engines of motor boats using heavy oil are being gradually overcome.

Small petrol or paraffin driven motor boats have been supplied to two vessels of the destroyer class, and have proved very useful. All new torpedo-boat destroyers will be provided with similar boats.

LARGE REPAIRS.

The following is a list of the important vessels that have been or are expected to be wholly or partially refitted under this heading in 1910–11:—

Battleship.—Irresistible has been completed.

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Armoured Cruisers.—Drake and Cressy will be advanced; Good Hope and Euryalus have been completed.

Protected Cruisers.—Amphitrite, Argonaut, Europa and Dido will be advanced; Highflyer and Pelorus have been completed; Sirius will be completed.

Gunboats.—Harrier, Hebe and Gossamer have been completed; Speedy will be advanced.

Minelayers.—Intrepid and Naiad have been completed.

New Works.

Cape of Good Hope.—Simon's Bay Dockyard Extension.—The main works have been finished. Certain minor works are in hand and approaching completion. The coal sheds and cooling of the cordite magazines are completed.

Chatham.—The electric light and power station at Lodge Hill is finished. The additional storage accommodation for oil fuel is well advanced. Work has been commenced on the house for distilling machinery, additional laboratory accommodation at Lodge Hill and detention quarters.

Coast-guard Signal Stations, &c.—Cleethorpes, Aberdeen, and Rosyth.—The stations are finished and in use. At Rosyth and Cleethorpes the quarters for the crews are also completed. *Wick, Seaham Harbour, and Dover.*—These stations are being built. *Totland.*—The contract has been let. *Sennen Cove.*—The site has been acquired, and it is hoped to let a contract at an early date.

Colombo.—Dock.—The balance of the Admiralty contribution has been paid to the Colonial Government. *Accommodation for Coal and Naval Stores.*—Contracts have been let for the steel-work which will be delivered in the current financial year.

Dover.—Harbour Works.—Have been completed, with the exception of a few small services.

The necessary dredging is being proceeded with.

The storage accommodation for oil fuel will be practically finished in the current financial year.

Deal Royal Marine Barracks.—Relaying Drainage.—It is proposed that drainage work shall be carried out on Admiralty property in conjunction with a scheme to be devised by the local authorities.

Gibraltar.—The dockyard extension works have been completed.

Good progress has been made with the reconstruction of the Rosia railway.

Harwich (Shotley).—The extension of the pier will be completed in the current financial year.

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Haulbowline.—The lengthening of the dock and the extension of the fitting and turning shop are nearing completion.

Hong Kong.—The reclamation at Kowloon is practically completed.

Good progress has been made with the quarters for dockyard foremen, &c., oil store, Kowloon coal sheds, and the transfer of the Victualling Yard from Hong Kong to Kowloon.

Jamaica.—The repairs to jetty and coal sheds will be completed by the War Department on repayment in the current financial year.

Malta.—Breakwater.—The lighthouse and quarters for the lighthouse keeper will be completed in 1910–11.

The extension of the water-tube boiler shop is practically completed and the wireless telegraphy station is in hand.

Plymouth.—Keyham Dockyard Extension.—The whole of the works are practically completed.

The caisson to be placed between Nos. 2 and 3 Basins, North Yard, has been delivered, and the extension of the machine shop, South Yard, is practically finished.

The building for air compressors, South Yard, and the additions to the electric light and power station will be completed in the current financial year.

The new smithery, North Yard, the docking accommodation for destroyers, South Yard, and the coaling depôt, North Yard, are well advanced.

The storage for heavy guns, North Yard, and the detention quarters, are in hand.

Portland.—The office accommodation is practically finished, and the reconstruction of the camber jetty is in hand.

The pier, near the canteen has been deferred, as it was found that it would interfere with the use of the torpedo range.

Portsmouth.—Good progress is being made with the new lock and dock.

The following works are practically completed:—New gantries in No. 3 ship fitting shop, gymnasium and swimming bath, at the Naval Barracks, and lunatic ward, Haslar Hospital.

The following are nearing completion:—New joiners' shop, extension of boiler shop and enlarging Priddy's Hard electric light and power station.

Considerable progress has been made on the following items:—Rearrangement of moorings and dolphins, and railways and storage accommodation for oil fuel.

Contracts have been let for the following items and the works

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are in hand:—Accommodation for floating dock, magazines at Bedenham, and detention quarters.

Some preliminary works in connection with the extension of the electric light and power station has been carried out and a contract will shortly be let.

Rosyth.—Good progress is being made with the Naval base. A contract will shortly be let for the new magazines.

Sheerness.—The extension of the rifle range has been completed.

Sheffield.—The testing-house and workshop for the Inspector of steel are well advanced.

Shoeburyness.—New pier. This work is being carried out by the War Department as joint repayment services.

Woolwich.—Research Department—Proof Butts; renew roof of No. 7 Bay. These works are being carried out by the War Department as joint repayment services.

Torpedo Ranges.—The torpedo factory at Gourock is practically finished. A contract has been let for additional workshop accommodation, and the work is in hand. The torpedo range at Arrochar is approaching completion.

Coaling Facilities and Fuel Storage.—Practically the whole of the work comprised in this item has been completed with the exception of the oil fuel installations at Plymouth and Portsmouth, which are well advanced.

Accommodation and Storage of Submarines.—The depôt for submarines at Dover is being proceeded with.

Fire Precautions.—Numerous small works are being carried out at various naval establishments.

The principal new works provided for in 1911–12 are:—

Cape of Good Hope.—Aerial ropeway—reconstructing trestles and terminals.

Dundee.—Storage accommodation for oil fuel.

Gibraltar.—Storage accommodation for submarines.

Harwich (Shotley).—Additional dormitories for the training establishment.

Haulbowline.—Gun-mounting shop.

Hong Kong.—Storage accommodation for submarines. Kowloon breakwater.

Humber.—Storage accommodation for oil fuel.

Invergordon (Cromarty Firth).—Storage accommodation for oil fuel.

Malta.—Storage accommodation for submarines.

Plymouth.—Devonport, North Yard, shop for repairing turbines.

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Bull Point Naval Ordnance Depôt, alterations to clean-ways and buildings.

Portland.—Depôt, reconstructing loading jetty. Breakwater, landing facilities.

Portsmouth.—Extension of the gun-mounting shop for the dock-yard, and a swimming bath for the Royal Naval College, Osborne.

Shoeburyness.—Armour-plate butts.

R. McK.

March 1st, 1911.

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STATEMENT showing the GROSS EXPENDITURE on NAVAL SERVICES for the years 1907–1908 to 1909–1910, together with the ESTIMATED GROSS EXPENDITURE for 1910–1911 and 1911–1912.

—	ACTUAL EXPENDITURE.			ESTIMATED EXPENDITURE.	
	1907–1908.	1908–1909.	1909–1910.	1910–1911.	1911–1912.
	£	£	£	£	£
Gross Expenditure (Navy Vote) (*a*)	32,866,506	33,827,491	37,385,460	42,412,524	46,204,799
Abate: Annuity under the Naval Works Acts, 1895 to 1905	1,214,402	1,264,033	1,325,809	1,322,752	1,322,752
	31,652,104	32,563,458	36,059,651	41,089,772	44,882,047
Expenditure from Loans	1,083,663	948,262	—	—	—
Value of Stores drawn from stock, without replacement, in aid of cash expenditure ...	1,294,802	551,125	155,900	20,800	40,000
Expenditure on behalf of Naval Services from Votes of other Departments	341,346	376,618	383,741	373,558	364,175
TOTAL	34,371,915	34,439,463	36,599,292	41,484,130	45,286,222

(*a*) In the years 1909–10 to 1911–12 expenditure on the completion of services originally scheduled in the Naval Works Acts, 1895 to 1905, is provided for entirely under "Gross Expenditure (Navy Votes)."

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Abstract of Navy

Votes.		Estimates,	
		Gross Estimate.	Appropriations in Aid.
	I.—Numbers.		
A.	Total Number of Officers, Seamen, Boys, Coast-guard, and Royal Marines	134,000	....
	II.—Effective Services.	£	£
1	Wages, &c., of Officers, Seamen and Boys, Coast-guard, and Royal Marines	7,703,000	191,500
2	Victualling and Clothing for the Navy	3,233,942	615,142
3	Medical Establishments and Services	289,787	18,887
4	Martial Law	4,000	100
5	Educational Services	215,363	64,863
6	Scientific Services	99,818	27,818
7	Royal Naval Reserves	397,768	9,768
8	Shipbuilding, Repairs, Maintenance, &c.:		
	Section I.—*Personnel*	3,563,500	22,000
	Section II.—*Matériel*	5,432,900	477,500
	Section III.—Contract Work	14,539,300	174,000
9	Naval Armaments	3,827,400	106,400
10	Works, Buildings, and Repairs at Home and Abroad	3,095,300	30,000
11	Miscellaneous Effective Services	547,339	15,339
12	Admiralty Office	415,250	8,850
	Total Effective Services £	43,364,667	1,762,167
	III.—Non-Effective Services.		
13	Half-Pay and Retired Pay	945,141	18,841
14	Naval and Marine Pensions, Gratuities, and Compassionate Allowances	1,499,121	30,921
15	Civil Superannuation, Compensation Allowances, and Gratuities	395,870	370
	Total Non-Effective Services £	2,840,132	50,132
	Grand Total £	46,204,799	1,812,299

Provision to the extent of £148,398 is included in the Estimates for 1911–1912 under Votes 8, 10 and 12, for the Acts, 1895 to 1905.

In addition to the Cash expenditure, stocks of Stores purchased in previous years

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Estimates for 1911–1912.

1911-1912.	Estimates, 1910–1911.			Difference on Net Estimates.		Votes.
Net Estimate.	Gross Estimate.	Appropriations in Aid.	Net Estimate.	Increase.	Decrease.	
Total Numbers. 134,000	131,000	...	Total Numbers. 131,000	Numbers. 3,000	Numbers. ...	A.
£	£	£	£	£	£	
7,511,500	7,543,600	154,200	7,389,400	122,100	...	1
2,618,800	3,087,649	587,349	2,500,300	118,500	...	2
270,900	281,817	17,917	263,900	7,000	...	3
3,900	11,000	100	10,900	...	7,000	4
150,500	219,265	61,865	157,400	...	6,900	5
72,000	98,897	29,697	69,200	2,800	...	6
388,000	382,116	9,616	372,500	15,500	...	7
						8
3,541,500	3,465,700	21,600	3,444,100	97,400	...	Sec. I.
4,955,400	5,157,200	543,100	4,614,100	341,300	...	Sec. II.
14,365,300	12,563,500	168,100	12,395,400	1,969,900	...	Sec. III.
3,721,000	2,906,000	125,000	2,781,000	940,000	...	9
3,065,300	3,025,300	30,000	2,995,300	70,000	...	10
532,000	472,327	13,327	459,000	73,000	...	11
406,400	397,585	8,785	388,800	17,600	...	12
41,602,500	39,611,956	1,770,656	37,841,300	3,775,100	13,900	
926,300	939,512	15,012	924,500	1,800	...	13
1,468,200	1,453,116	22,716	1,430,400	37,800	...	14
395,500	407,940	440	407,500	...	12,000	15
2,790,000	2,800,568	38,168	2,762,400	39,600	12,000	
44,392,500	42,412,524	1,808,824	40,603,700	3,814,700	25,900	
			Net Increase			£3,788,800

continuation of services originally provided for out of funds raised under the authority of the Naval Works will be drawn upon without replacement to the extent of £40,000 (estimated).

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STATEMENT of the Principal Points of DIFFERENCE between the ESTIMATES of 1910–1911 and those for 1911–1912.

INCREASES.		
		£
Wages, &c., of Officers, Seamen and Marines		164,100
Victualling and Clothing for the Navy		128,500
Medical Establishments and Services		7,200
Scientific Services		2,800
Royal Naval Reserves		15,500
Wages of Artificers and Police in Dockyards		88,252
Naval Stores and Fuel, &c., for the Fleet		257,250
Decrease in Amount of Receipts arising from the Sale of Ships		156,300
Propelling Machinery for His Majesty's Ships and Vessels (Contract)		318,044
Hulls of Ships (Contract)		705,212
Repairs and Alterations by Contract of Ships, &c.		40,000
Gun Mountings and Air-Compressing Machinery (Contract)		1,029,908
Machinery for His Majesty's Shore Establishments (Contract)		160,000
Purchase of Ships, Vessels, &c.		7,000
Naval Ordnance Establishments, and Naval Ordnance Stores		945,900
Works, Buildings, and Repairs		70,000
Miscellaneous Effective Services		75,000
Non-Effective Services		39,650
Miscellaneous Increases		24,918
	£	4,235,564

DECREASES.	£	
Martial Law	7,000	
Educational Services	6,900	
Increase in Amount of Receipts arising from the Sale of Unserviceable Naval Stores, Machinery, Gun Mountings, &c	40,000	
Auxiliary Machinery for His Majesty's Ships and Vessels (Contract)	12,038	
Armour for His Majesty's Ships and Vessels (Contract)	272,326	
Repayment from the Government of India on account of Services rendered by His Majesty's Ships engaged in the Suppression of the Arms Traffic in the Persian Gulf	108,500	
		446,764
Net Increase	£	3,788,800

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STATEMENT showing the Total Estimated EXPENDITURE for the NAVAL SERVICE, including Amounts provided in the NAVY ESTIMATES, as well as in the CIVIL SERVICE and other ESTIMATES, for the following Services :—

		1911–1912.	1910–1911.
		£	£
NAVY ESTIMATES:			
Estimated Expenditure (after deducting Appropriations in Aid) . .		44,392,500	40,603,700
CIVIL SERVICE ESTIMATES: (*a*)			
Estimated Expenditure under—			
Class I. Vote 10.—Public Buildings, Great Britain:	£		
Maintenance and Repairs, including New Works, Alterations, &c. .	13,775		
Rents, Insurance, Tithes, &c. . .	2,245		
Fuel, Light, Water, &c. . . .	6,500		
Furniture	3,150		
		25,670	46,260
Class I. Vote 11.—Surveys of the United Kingdom		4,690	2,660
„ I. „ 14.—Rates on Government Property . . .		142,500	137,000
„ I. „ 15.—Public Works and Buildings, Ireland:			
Coast-guard, viz.:	£		
Purchase of Sites . .	—		
New Works and Alterations, including Naval Reserve Stations . .	3,472		
Maintenance and Supplies . .	4,414		
Naval Reserve, viz.:			
Maintenance and Supplies . .	44		
		7,930	6,930
Class II. Vote 8.—Board of Trade:			
Staff and Incidental Expenses in connection with the Royal Naval Reserve Force . . .		3,460	3,736
„ II. „ 9.—Mercantile Marine Services:			
Staff and Incidental Expenses in connection with the Royal Naval Reserve Force . . .		2,500	2,500
„ II. „ 13.—Government Chemist:			
Analysis of Food, &c.		400	—
„ II. „ 15.—Exchequer and Audit Department (Cost of Audit):	£		
Navy Cash Accounts . . .	8,940		
Expense and Manufacturing Accounts	5,675		
Store Accounts	6,709		
		21,324	20,603
Class II. Vote 24.—Stationery and Printing		103,000	101,000
„ III. „ 1.—Law Charges, England		10,966	10,842
Maintenance of Naval Prisoners:			
„ III. „ 8.—Prisons, England and the Colonies . . .		720	1,164
„ III. „ 14.—Prisons, Scotland		300	300
„ III. „ 21.—Prisons, Ireland		382	408
REVENUE DEPARTMENT ESTIMATES:			
Vote 1.—Customs.—Percentage for provision of funds for District Paymasters of the Coast-guard, &c.		303	255
Vote 1.—Customs.—Staff and Incidental Expenses in connection with the Royal Naval Reserve Force		3,300	3,300
Vote 1.—Customs.—Analysis of Food, &c. (*b*)		—	300
Vote 3.—Post Office.—Postage of Official Correspondence (including Parcels)	£24,340		
Vote 3.—Post Office Telegraphs.—Official Telegraphs and Expenses in connection with Telegraphs (Admiralty Wires, and Services of Clerks)	11,790		
Vote 3.—Post Office Telephone Services	600		
		36,730	36,300
Total . . . £		44,756,675	40,977,258

Note.—In addition to the Services shown above, an annuity of £16,243 18*s.* is payable to the Commissioners of Woods, &c. from the Consolidated Fund, under the Public Offices Sites Act of 1882 (45 & 46 Vict. c. 32).

(*a*) Provision is also made in the Estimate for Osborne (Class I., Vote 2) for expenditure in connection with the treatment of invalid Officers of the Navy in the Convalescent Home at Osborne.

(*b*) Provision for this service in 1911-12 is included under Civil Service Estimates, Class II., Vote 13, "Government Chemist."

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STATEMENT showing the CONTRIBUTIONS from INDIA and the COLONIES towards NAVAL EXPENDITURE.

RECEIVED FROM.	NATURE OF SERVICE.	VOTE. 1	2	3	6	7	8 Section I.	8 Section II.	8 Section III.	9	11	12	13	14	15	TOTAL.
		£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
India	Maintenance of His Majesty's Ships in Indian Waters	28,000	9,100	500	..	..	12,500	10,200	13,000	11,600	2,500	..	4,300	8,300	..	100,000
	Indian Troop Service (on account of work performed by the Admiralty)	..	..	..	..	..	..	..	..	..	..	3,050	..	..	350	3,400
	Repayment on account of services rendered by His Majesty's Ships engaged in the suppression of the Arms Traffic in the Persian Gulf	42,000	10,000	200	..	..	..	30,000	6,350	5,900	2,000	..	3,800	8,250	..	108,500
Australian Commonwealth	Survey of the N.-W. coast of Australia	3,900	1,300	..	550	..	200	1,550	..	..	..	..	..	..	..	7,500
	Maintenance of an Australasian Squadron and the establishment of a branch of the Royal Naval Reserve															200,000
Dominion of New Zealand	Maintenance of an Australasian Squadron and of the Imperial Navy generally, also for the establishment of a branch of the Royal Naval Reserve	72,500	22,900	700	..	6,300	..	38,400	118,700	6,900	8,700	..	10,600	14,300	..	100,000
Cape Colony	General maintenance of the Navy	11,100	4,600	..	..	..	4,900	9,100	14,100	6,200	..	..	..	..	..	50,000
Natal		7,700	3,200	..	..	..	3,400	6,400	9,900	4,400	..	..	..	..	..	35,000
Newfoundland	Maintenance of a branch of the Royal Naval Reserve	..	..	..	..	3,000	..	..	..	..	..	..	..	..	..	3,000
	Total	£ 165,200	51,100	1,400	550	9,300	21,000	95,650	162,050	35,000	13,200	3,050	18,700	30,850	350	607,400

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VOTE (A).

NUMBERS of OFFICERS, SEAMEN and BOYS, COAST-GUARD, and ROYAL MARINES Borne on the Books of His Majesty's Ships, and at the ROYAL MARINE DIVISIONS.

One Hundred and Thirty-four Thousand.
(134,000.*)

I.—SEA SERVICE.

Under which Vote Provided.	RANKS, &c.	NUMBERS, ALL RANKS. 1911–1912.		1910–1911.		Numbers of all Ranks borne on 1st January, 1911.
	FOR HIS MAJESTY'S FLEET:					
	Flag Officers	26		27		
	Commissioned Officers	4,692		4,669		
	Subordinate Officers	736		668		
	Warrant Officers	1,960		1,819		
	Petty Officers and Seamen	96,670		94,784		
	Boys (Service)	2,161	106,245	2,149	104,116	104,332
	COAST-GUARD:					
	Commissioned Officers	102		103		
Vote 1	Chief Officers and Second Mates.	208		222		
	Petty Officers and Seamen	2,790	3,100	2,795	3,120	3,043
	ROYAL MARINES (for Service Afloat and on Shore):					
	Commissioned Officers	425		449		
	Warrant Officers	58		44		
	Staff Sergeants and Sergeants	1,299		1,326		
	Band Ranks, Buglers and Musicians	1,641		1,674		
	Rank and File	13,296		13,468		
	Band Boys	241	(a) 16,960	224	17,185	16,966
	Total		126,305		124,421	124,341
	Net Increase		1,884			

* Average for the year.

(a) Including 30 Officers, &c., Sub-Heads F and H.

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VOTE (A)—*continued.*

II.—OTHER SERVICES.

Under which Vote Provided.	RANKS, &c.	NUMBERS, ALL RANKS. 1911-1912.		1910-1911.		Numbers of all Ranks borne on 1st January, 1911.
Vote 1	Naval Cadets	805		790		
	Engineer Cadets			4		
	Pensioners in Home Ships, &c.	287		304		
	Boys under Training—					
	Seaman Class	4,340		3,295		
	Artificer Class	572	(b)	523		
			6,004		4,916	5,425
Vote 2	For Victualling and Clothing for the Navy	7		7		
Vote 3	For Medical Establishments and Services	607		585		
Vote 4	For Martial Law	..		14		
Vote 5	For Educational Services	551		561		
Vote 6	For Scientific Services	3		3		
Vote 7	For Royal Naval Reserves	60		59		
Vote 8	For Shipbuilding, Repairs, Maintenance, &c.:					
	Section I.	221		208		
	Section II.	29		29		
	Section III.	96		82		
Vote 9	For Naval Armaments	81		80		
Vote 12	For Admiralty Office	36		32		
			1,691		1,663	1,665
	Total		(c) 7,695		6,579	7,090
	Net Increase		1,116			
	Total, Sea Service	126,305		124,421		
	„ other Services	7,695		6,579		
			134,000		131,000	
	Net Increase		3,000			

(b) Including 13 Officers, Sub-Head H.

(c) Including Officers, Seamen and Service Boys	2,301	..	2,273
„ Retired Officers and Pensioners	287	..	304
„ Boys (Training, Seaman Class)	4,340	..	3,295
„ Boys (Training, Artificer)	572	..	523
„ Boys (Training, Artisan)	56	..	45
„ Royal Marines	139	..	139
	7,695	..	6,579

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VOTE 8.

SHIPBUILDING, REPAIRS, MAINTENANCE, &c.

I.—ESTIMATE of the SUM which will be required, in the YEAR ending 31st March, 1912, to defray the EXPENSES of SHIPBUILDING, REPAIRS, MAINTENANCE, &c., including the COST of ESTABLISHMENTS of DOCKYARDS and NAVAL YARDS at HOME and ABROAD.

DOCKYARD WORK.

SECTION I.—PERSONNEL.—Three Million Five Hundred and Forty-one Thousand Five Hundred Pounds.

(£3,541,500.)

SECTION II.—MATÉRIEL.—Four Million Nine Hundred and Fifty-five Thousand Four Hundred Pounds.

(£4,955,400.)

CONTRACT WORK.

SECTION III.—CONTRACT WORK.—Fourteen Million Three Hundred and Sixty-five Thousand Three Hundred Pounds.

(£14,365,300.)

(Total of the Three Sections of Vote 8 . . **£22,862,200.**)

II.—SUB-HEADS under which SECTION I., PERSONNEL, of this VOTE will be accounted for.

DOCKYARD WORK. SECTION I.—PERSONNEL.	ESTIMATES. 1911–1912.	1910–1911.	Increase.	Decrease.
Dockyards at Home.	£	£	£	£
A.—Salaries and Allowances . . .	(*a*) 245,328	240,181	5,147	..
B.—Wages, &c., of Men, and hire of Teams	2,707,303	2,618,745	88,558	..
C.—Wages, &c., of Police Force . .	55,825	54,375	1,450	..
D.—Contingencies	2,900	2,800	100	..
Naval Yards Abroad.				
E.—Salaries and Allowances . . .	(*a*) 112,695	108,444	4,251	..
F.—Wages, &c., of Men, and hire of Teams	417,444	418,769	..	1,325
G.—Wages, &c., of Police Force . .	21,355	21,786	..	431
H.—Contingencies	650	600	50	..
	£ 3,563,500	3,465,700	99,556	1,756
Deduct,—				
I.—Appropriations in Aid . . .	22,000	21,600	400	..
	£ 3,541,500	3,444,100	99,156	1,756
		Net Increase .	£97,400 (*b*)	

(*a*) These amounts include the sums of £39,088 for pay of Inspectors of Trades and Senior Draughtsmen at Home and £15,156 for pay of Inspectors of Trades Abroad, which is charged direct to the cost of shipbuilding.

(*b*) This Vote is increased by a sum of £730 in respect of Dockyard Labour on Fixed Machinery originally provided for by advances under the Naval Works Acts, 1895 to 1905.

Note.—Provision has been made for New Construction in the above Vote to the extent of—

Section 1	£900,100
„ 2	677,720
„ 3	13,486,057
	£15,063,877

The difference (£7,192) between the provision under Section III. of the Vote (£13,486,057) and the amount shown in the Programme (£13,478,865) is due to the estimated withdrawals from Stock of transferable auxiliary machinery, gun mountings and steamboats during the year being less than the cash payments for like articles brought into Stock in the same period.

In addition to the Cash Vote of £4,955,400 under Section II., stocks of Naval Stores purchased in previous years will be drawn upon without replacement during 1911–1912 to the extent of £40,000.

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VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &c.—*continued.*

II.—SUB-HEADS under which SECTION II., MATÉRIEL, of this VOTE will be accounted for.

	ESTIMATES. 1911–1912.	ESTIMATES. 1910–1911.	Increase.	Decrease.
DOCKYARD WORK—*continued.*				
SECTION II.—MATÉRIEL.				
Naval Stores, &c.	£	£	£	£
A.—Timber, Masts, Deals, &c. . .	209,000	180,000	29,000	..
B.—Metals and Metal Articles . .	1,117,600	1,016,000	101,600	..
C.—Coal for Yard purposes . .	137,000	122,000	15,000	..
D.—Hemp, Canvas, &c.	210,000	188,000	22,000	..
E.—Paint Materials, Oils, Pitch, Tar, Tallow, Boats, Furniture, and other Miscellaneous Articles .	743,000	736,100	6,900	..
F.—Electrical, Torpedo, and other Apparatus	483,500	484,000	..	500
G.—Freight	50,000	48,000	2,000	..
H.—Rents, Water, &c., Dockyards at Home, and Naval Yards Abroad	39,800	38,200	1,600	..
I.—Gas and Electric Current, Dockyards at Home and Naval Yards Abroad	14,000	15,900	..	1,900
£	3,003,900	2,828,200	178,100	2,400
Deduct,—			*Add—*	
J.—Appropriations in Aid. . .	436,500	502,100	65,600	..
£	2,567,400	2,326,100	243,700	2,400
Fuel, &c., for the Fleet.				
K. I.—Fuel, Lubricating Oils, &c., for the Fleet	2,097,500	1,991,000	106,500	..
K. II.—New Craft and Machinery for Coaling, &c.	103,000	127,000	..	24,000
K. III.—Salaries, Wages, and Allowances	126,000	125,000	1,000	..
K. IV.—Maintenance of Craft for Coaling, &c., and incidental expenses	102,500	86,000	16,500	..
£	2,429,000	2,329,000	124,000	24,000
Deduct,—				
L.—Appropriations in Aid . . .	41,000	41,000	..	..
£	2,388,000	2,288,000	124,000	24,000
£	4,955,400	4,614,100	367,700	26,400
		Net Increase . .	£341,300 (*a*)	

(*a*) This Vote is increased by a sum of £720 under Naval Stores in respect of Fixed Machinery originally provided for by advances under the Naval Works Acts, 1895 to 1905.

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VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &C.—*continued.*

II.—SUB-HEADS under which SECTION III., CONTRACT WORK, of this VOTE will be accounted for.

	ESTIMATES. 1911-1912.	ESTIMATES. 1910-1911.	Increase.	Decrease.
SECTION III.—CONTRACT WORK.	£	£	£	£
A.—Propelling, &c., Machinery for His Majesty's Ships, Vessels, &c.	4,225,401	3,907,357	318,044	..
B.—Auxiliary Machinery, &c., for His Majesty's Ships, Vessels, &c.	102,962	115,000	..	12,038
C.—Hulls of Ships, &c., Building by Contract	4,307,220	3,602,008	705,212	..
D.—Armour for His Majesty's Ships and Vessels	2,482,807	2,755,133	..	272,326
E.—Repairs and Alterations by Contract of Ships, &c., and their Machinery and Stores	145,000	105,000	40,000	..
F.—Inspection of Contract Work	110,000	110,000	..	..
G.—Gun Mountings and Air-Compressing Machinery	2,570,910	1,541,002	1,029,908	..
H.—Machinery, &c., for His Majesty's Shore Establishments at Home and Abroad	400,000	235,000	165,000	..
H.H.—Fixed Machinery, formerly provided for by Advances under the Naval Works Acts, 1895 to 1905	25,000	30,000	..	5,000
I.—Royal Reserve of Merchant Cruisers.	150,000	150,000	..	..
K.—Purchase of Ships, Vessels, &c.	20,000	13,000	7,000	..
	£ 14,539,300	12,563,500	2,265,164	289,364
Deduct,—				
L.—Appropriations in Aid	174,000	168,100	5,900	..
	£ 14,365,300	12,395,400	2,259,264	289,364
			Net Increase	£1,969,900 (*a*)

(*a*) This Vote is increased by a sum of £25,000 in respect of Fixed Machinery originally provided for by advances under the Naval Works Acts, 1895 to 1905.

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VOTE 9.

NAVAL ARMAMENTS.

I.—ESTIMATE of the SUM which will be required in the Year ending 31st March, 1912, to defray the Expense of NAVAL ARMAMENTS.

Three Million Seven Hundred and Twenty-one Thousand Pounds.
(£3,721,000.)

II.—SUB-HEADS under which this Vote will be accounted for.

	ESTIMATES.		Increase.	Decrease.
	1911-1912.	1910-1911.		
NAVAL ORDNANCE, &c., ESTABLISHMENTS AT HOME AND ABROAD.	£	£	£	£
A.—Salaries and Allowances . .	54,840	46,529	8,311	..
B.—Wages of Artificers, &c. . .	341,700	214,000	127,700	..
C.—Wages of Crews of Naval Ordnance Vessels . . .	12,200	12,200	..	..
D.—Wages, &c., of Police Force .	29,000	28,082	918	..
E.—Medical Attendance, Gas, Rents, Water, and Contingencies .	16,760	11,889	4,871	..
NAVAL ORDNANCE STORES.				
F.—Guns	1,160,000	1,003,300	156,700	..
G.—Projectiles and Ammunition .	1,210,000	800,000	410,000	..
H.—Torpedoes and Gun-cotton .	308,600	329,000	..	20,400
I.—Small Arms, Torpedo Materials, Maintenance of Vessels, and Miscellaneous . . .	428,000	235,000	193,000	..
K.—Inspection, Proof, Experiments, &c.	245,000	200,000	45,000	..
L.—Freight and Incidental Charges	21,300	26,000	..	4,700
£	3,827,400	2,906,000	946,500	25,100
Deduct,— M.—Appropriations in Aid . .	106,400	125,000	..	18,600
£	3,721,000	2,781,000	946,500	6,500
		Net Increase . .	£940,000	

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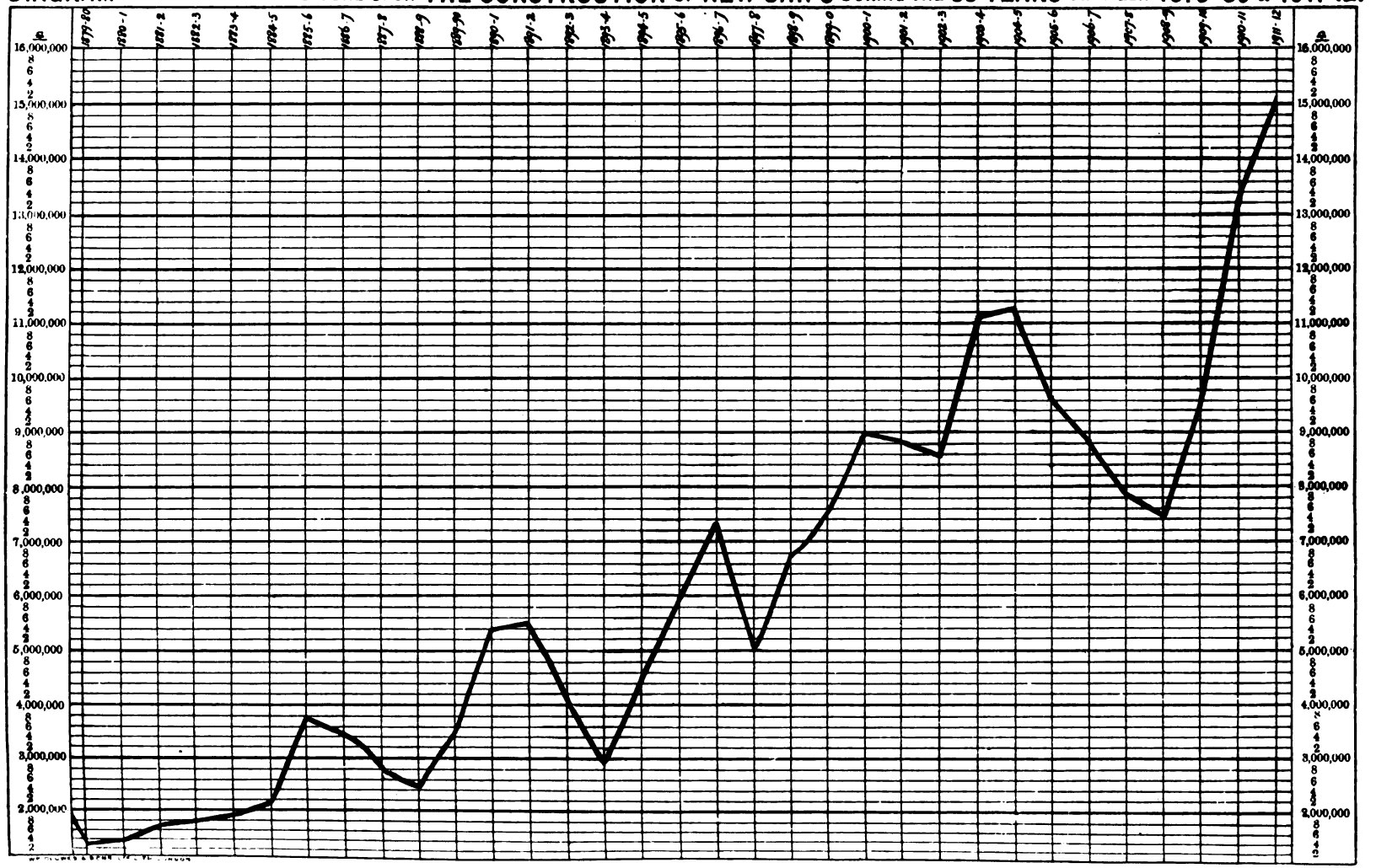
DIAGRAM SHEWING THE EXPENDITURE UPON THE CONSTRUCTION OF NEW SHIPS DURING THE 33 YEARS BETWEEN 1879-80 & 1911-12.



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RECAPITULATION OF ESTIMATED EXPENDITURE.

SUB-HEADS OF EXPENDITURE.	Total Direct Expenditure.	Establishment, etc., Charges Apportioned.	New Construction.	Repairs, Alterations, etc.			Sea Stores, etc.	Establishment, Incidental, and Miscellaneous Charges Unappropriated.		Aggregate, 1911–12.
				Ships for Refits or Re-commission.	Ships in Commission and Reserve.	Other Naval Services.				
DOCKYARD WORK:	£	£	£	£	£	£	£	£	£	£
Section I.—*Personnel*.	2,517,991	1,240,595	1,034,170	541,831	1,203,016	69,265	59,538	354,156	496,610	3,758,586
Section II.—*Materiel*.	2,516,215	1,641,841	772,055	285,189	577,945	50,596	1,084,936	856,422	875,113	4,158,056
CONTRACT WORK:										
Section III. . .	13,876,107	761,641	13,672,363	41,392	284,739	75,254	..	14,000	205,800	14,637,748
Total Estimated Expenditure for 1911–1912	18,910,313	3,644,077	15,478,588	868,412	2,065,700	195,115	1,144,474	1,224,578	1,577,523	22,554,390
Totals of Sub-Heads £	22,554,390		15,478,588	3,129,227			1,144,474	2,802,101		22,554,390

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PROGRAMME of

PROGRAMME of the ESTIMATED EXPENDITURE in CASH, and in NET
MAINTENANCE, &c., in
(Exclusive of the FLEET

SUB-HEADS under which this ESTIMATED EXPENDITURE will be
provisions of Section 1 (2), ARMY

	ESTIMATED EXPENDITURE IN				
	Direct Expenditure.				
	Dockyard Work.		Contract Work, Sec. III.	Total Direct Expenditure. (a)	
	Personnel, Sec. I.	Matériel, Sec. II.			
NEW CONSTRUCTION:	£	£	£	£	
A.—DOCKYARD-BUILT SHIPS—					
Hulls, &c. (c)	797,695	571,040	1,837,366 (f)	3,206,101	1
Machinery	63,300	32,105	856,556	951,961	2
	860,995	**603,145**	**2,693,922**	**4,158,062**	**3**
B.—CONTRACT-BUILT SHIPS—					
Hulls, &c. (c)	34,605	70,105	7,130,331 (g)	7,235,041	4
Machinery	..	..	3,113,089	3,113,089	5
	34,605	**70,105**	**10,243,420**	**10,348,130**	**6**
C.—OTHER VESSELS, &c. (d) . .	4,500	4,470	541,523	550,493	7
TOTAL NEW CONSTRUCTION	**900,100**	**677,720**	**13,478,865**	**15,056,685 (e)**	**8**
D.—REPAIRS, ALTERATIONS, &c. .	1,617,891	782,195	397,242	2,797,328	9
E.—STORES, FOR MAINTENANCE, &c.	..	1,056,300	..	1,056,300	10
F.—ESTABLISHMENT, INCIDENTAL, AND MISCELLANEOUS CHARGES, UNAPPROPRIATED .	..	..	..	..	11
TOTAL . . £	**2,517,991**	**2,516,215**	**13,876,107**	**18,910,313**	**12**

(c) Including Hydraulic and Transferable Gun Mountings, &c.
(d) Including Harbour Craft, and excluding Torpedo Boats, &c., the value of which is included under other Sub-Heads.
(e) Exclusive of £1,800 provided under Vote 2 for new Lighters for Victualling Yard Service, £13,400 provided under Vote 9 for New Vessels for Naval Ordnance Store Service and £65,200 for Coaling Craft, Vote 8, Section 2, Sub-Head K.
(f) Including £952,500 for Armour.
(g) Including £1,520,307 for Armour.

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VALUES OF STORES issued for SHIPBUILDING, REPAIRS, ALTERATIONS, the Year 1911–1912.
COALING SERVICE.)
accounted for in the NAVY EXPENSE ACCOUNTS, under the AND NAVY AUDIT ACT, 1889.

	1911–1912.		EXPENDITURE AS ESTIMATED IN NAVY ESTIMATES, 1910–1911.			Difference between Direct Expenditure, 1910–1911 (B) and 1911–1912 (A).	
	Establishment, &c., Charges, apportioned.	Aggregate, 1911–1912.	Direct Expenditure. (B)	Establishment, &c., Charges, apportioned.	Aggregate, 1910–1911.	Increase.	Decrease.
	£	£	£	£	£	£	£
1	228,746	3,434,847	(h) 2,755,479	224,218	2,979,697	450,622	..
2	27,168	979,129	987,893	25,065	1,012,958	..	35,932
3	**255,914**	**4,413,976**	**3,743,372**	**249,283**	**3,992,655**	**414,690**	..
4	112,796	7,347,837	(i) 6,276,988	109,312	6,386,300	958,053	..
5	44,696	3,157,785	2,871,935	44,938	2,916,873	241,154	..
6	**157,492**	**10,505,622**	**9,148,923**	**154,250**	**9,303,173**	**1,199,207**	..
7	8,497	558,990	502,660	12,657	515,317	47,833	..
8	**421,903**	**15,478,588**	**13,394,955**	**416,190**	**13,811,145**	**1,661,730**	..
9	331,899	3,129,227	2,546,888	311,956	2,858,844	250,440	..
10	88,174	1,144,474	997,130	86,882	1,084,012	59,170	..
	841,976			815,028			
11	2,802,101	2,802,101	..	2,379,354	2,379,354	..	..
12	**3,644,077**	**22,554,390**	**16,938,973**	**3,194,382**	**20,133,355**	..	..
	NET INCREASE ON DIRECT EXPENDITURE . . .						**£1,971,340**

(A) Including £829,080 for Armour.
(B) Including £1,916,053 for Armour.

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LIST of NEW SHIPS and VESSELS Estimated to be Passed into COMMISSION during the Years 1911–1912 and 1910–1911.

1911–1912.				1910–1911.			
NAME OF SHIP.	Load Displacement in Tons.	Estimated Horse Power.	Number of Guns.	NAME OF SHIP.	Load Displacement in Tons.	Estimated Horse Power.	Number of Guns.
ARMOURED SHIPS.				**ARMOURED SHIPS.**			
Hercules	20,000 (e)	25,000	10	St. Vincent	19,250	24,500	10
Colossus	20,000 (e)	25,000	10	Collingwood	19,250	24,500	10
Orion	..	..	..	Neptune	19,900	25,000	10
Conqueror	..	..	..	Indefatigable	18,750	43,000	8
Monarch	..	..	..				
Thunderer	..	..	..				
Lion	..	..	..				
Princess Royal	..	..	..				
UNARMOURED SHIPS.				**UNARMOURED SHIPS.**			
Dartmouth	5,250	22,000	8	Bristol	4,800	22,000	12
Falmouth	5,250	22,000	8	Glasgow	4,800	22,000	12
Weymouth	5,250	22,000	8	Gloucester	4,800	22,000	12
Yarmouth	5,250	22,000	8	Liverpool	4,800	22,000	12
Blonde	3,360	18,000	10	Newcastle	4,800	22,000	12
Active	..	..	..	Blanche	3,360	18,000	10
TORPEDO CRAFT.							
TORPEDO BOAT DESTROYERS 29	..	Various	..				
SUBMARINE BOATS 6	..	..	..	**TORPEDO CRAFT.**			
MISCELLANEOUS.				TORPEDO BOAT DESTROYERS 28	..	Various	..
Maidstone	3,600	2,800	..				
Adamant	935	1,400	..				
Alecto	935	1,400	..	SUBMARINE BOATS 3	..	..	..
Watchful	560	800	..				

(e) Estimated.

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Result of Test of Gunlayers with Heavy Guns in His Majesty's Fleet, 1901–1910.

		1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.
Number of ships that fired		127	139	134	108	100	89	121	117	116	117
Number of guns or turrets		1,137	1,241	1,296	1,171	1,096	1,073	1,365	1,277	1,312	1,318
Number of hits	1906 target	3,562	4,789	5,996	5,748	4,374	5,733	7,547	..	..	..
	1907 ,,	..	..	..	..	..	..	4,073	4,826	5,108	3,520
	Ricochet	..	..	..	..	..	..	..	..	..	436
Number of misses	1906 target	6,244	6,863	7,028	7,664	3,357	2,328	1,991	..	..	..
	1907 ,,	..	..	..	..	..	..	5,465	4,183	4,330	3,253
Excess of hits over misses	1906 ,,	Nil	Nil	Nil	Nil	1,017	3,405	5,556	..	..	..
	1907 ,,	..	..	..	..	..	..	Nil	643	778	703
Excess of misses over hits	1906 ,,	2,682	2,074	1,032	1,916	Nil	Nil	Nil	..	..	..
	1907 ,,	..	..	..	..	..	..	1,392	Nil	Nil	Nil
Percentage of hits to rounds fired	1906 ,,	36·3	41·1	46·04	42·86	56·58	71·12	79·13	..	..	..
	1907 ,,	..	..	..	..	..	..	42·70	53·57	54·12	51·85
Hits per gun per minute—											*†
12″ and 10″	1906 target	·33	·38	·53	·47	·58	·81	·61	..	..	..
	1907 ,,	..	..	..	..	..	..	·40	·56	·63	·70*
9·2″	1906 ,,	·31	·35	·70	·73	1·40	2·84	3·25	..	..	..
	1907 ,,	..	..	..	..	..	..	2·01	2·20	1·94	2·01*
7·5″	1906 ,,	..	..	..	..	..	..	3·48	..	..	..
	1907 ,,	..	..	..	..	..	..	1·58	2·51	2·47	2·61*
6″ B.L. and Q.F.	1906 ,,	1·81	2·41	2·63	2·63	4·14	5·68	5·93	..	..	..
	1907 ,,	..	..	..	..	..	..	3·32	3·98	4·03	3·69*
4·7″ Q.F. and 4″ B.L. and Q.F.	1906 ,,	1·93	2·02	2·47	2·28	3·73	4·96	5·73	..	..	..
	1907 ,,	..	..	..	..	..	..	2·38	3·32	4·06	3·84*
Number of ships from whom no returns were received.		47	19	30	43	Nil	Nil	3	8	10	12

* Ricochet hits counting half a hit. Not directly comparable with previous years.

† The figures for 1910, counting ricochet hits as a whole hit, as in previous years, would be 54·86.

Abstract, 1910.

Order of Merit.	Fleet or Squadron.	No. of Ships.	No. of Men Firing.	Points per Gun or Turret.	First Ship in Fleet.	Score.
1	China	6	70	56·628	Bedford	67·81
2	Home Fleet, Second Division, and Second Cruiser Squadron	16	226	47·567	Natal	90·48
3	Cape of Good Hope	3	29	46·930	Hermes	75·66
4	Home Fleet, Third Division, and Cruisers	27	304	46·195	Mars	72·62
5	Home Fleet, First Division, and First Cruiser Squadron	15	156	45·798	Temeraire	81·91
6	Fourth Cruiser Squadron	3	24	41·888	Brilliant	52·52
7	Atlantic Fleet and Fifth Cruiser Squadron.	11	167	41·303	Drake	67·27
8	East Indies	1	11	40·09	Hyacinth	40·09
9	Mediterranean Fleet and Sixth Cruiser Squadron	13	170	37·641	Exmouth	51·57
10	Australia	8	82	35·455	Powerful	55·65
11	Special Service Tenders	14	79	29·650	Cornwall	71·42
	Total, 1910 Test	117	1,318	42·649		
	Total, 1909 Test	116	1,312	46·098		
	Difference	+1	+6	−3·449		

Note.—The 4-in. guns of Bellerophon and Invincible classes are not included in this Abstract.

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Results of Test of Gunlayers with Heavy Guns.

Order of Merit.	Ship.	Whether 1st or 2nd Firing.	Points.	No. of Men Firing.	Guns.	Rounds.	Total Number of Hits. Direct.	Total Number of Hits. Ricochet.	Rounds per minute.	Hits per minute.	Points per Gun or Turret.	Best Shot in Ship.	Hits per minute by Best Shot.	Comparison with previous year. Hits per minute 1909.	Comparison with previous year. Hits per minute 1910. †
1	Natal	1st	90·48	6	9·2″ Mark X.	36	29	2	5·44	4·47	92·17	A. Murrin, P.O. (1)	5·34	3·67	4·47
				4	7·5″ B.L.	20	17	2	5·94	5·32	87·94	J. Scott, P.O. (1)	8·17	5·43	5·32
2	Temeraire	2nd	81·91	10	12″ Mark X.	37	29	3	4·09	3·35	81·91	H. Oliver, Act. Bom., R.M.A.	3·30	2·62	3·35
3	Hermes	2nd	75·66	11	6″ Q.F.	65	46	1	7·80	5·68	75·66	F. Lacey, P.O. (1)	8·57	3·18	5·68
4	Britannia	2nd	74·38	4	12″ Mark IX.	13	7	2	2·69	1·66	40·59	G. Fisher, C.P.O.	1·24	0·55	1·66
				4	9·2″ Mark X.	23	18	0	4·08	3·24	66·81	T. Flood, P.O. (1)	4·62	1·38	3·24
				10	6″ B.L. XI.	55	45	2	8·34	7·02	84·17	T. Watkins, P.O. (1)	10·98	5·10	7·02
5	Mars	1st	72·62	4	12″ Mark VIII.	14	5	4	3·04	1·52	43·18	E. Pring, P.O. (1)	2·00	1·64	1·52
				12	6″ Q.F.	72	51	9	7·52	5·82	77·52	H. Filewood, P.O. (1)	7·50	4·25	5·82
6	Cornwall	1st	71·42	12	6″ B.L. VII. (*b*)	66	48	3	7·70	5·75	71·42	E. Burch, Pte., R.M.L.I.	7·32	..	5·75
7	Majestic	2nd	69·70	4	12″ Mark VIII.	15	3	0	3·50	0·71	20·17	C. Steer, C.P.O.	1·07	1·09	0·71
				12	6″ Q.F.	71	57	1	7·19	5·80	77·26	G. Skinnard, P.O. (1)	7·94	3·50	5·80
8	Bedford	2nd	67·81	12	6″ B.L. VII. (*b*)	62	39	9	7·70	5·46	67·81	J. Williams, Sgt., R.M.L.I.	10·31	6·17	5·46
9	Drake	2nd	67·27	2	9·2″ Mark X.	12	7	1	4·87	3·05	62·89	R. Evans, P.O. (1)	4·11	2·00	3·05
				16	6″ B.L. VII. (*b*)	93	49	10	9·18	5·46	67·81	W. Ingram, P.O. (1)	12·86	4·94	5·46
10	Astræa	2nd	66·35	2	6″ Q.F.	11	6	1	7·18	4·51	60·07	S. Mann, P.O. (1)	7·01	1·50	4·51
				8	4·7″ Q.F.	48	28	4	10·05	6·42	67·92	H. Horrocks, P.O. (2)	11·00	4·88	6·42
11	Topaze	1st	64·27	12	4″ Q.F.	68	45	2	11·04	7·57	64·27	W. Beaumont, Sgt., R.M.L.I.	13·33	..	7·57
12	Hannibal	1st	61·89	4	12″ Mark VIII.	14	7	0	2·96	1·52	43·18	C. Harvey, C.P.O.	2·65	0·55	1·52
				12	6″ Q.F.	68	44	7	6·94	4·88	65·00	J. Johnston, Sgt., R.M.L.I.	7·14	4·00	4·88

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13	Jupiter	2nd	61·48	4	12" Mark VIII.	14	3	3	2·90	0·93	22·74	A. Clark, P.O. (1)	0·83	1·27	0·93
				12	6" Q.F.	69	50	1	6·94	5·10	67·93	S. Caswell, Crpl., R.M.A.	8·00	3·50	5·10
14	Victorious	1st	60·40	4	12" Mark VIII.	15	3	0	1·55	0·62	15·16	W. Fogg, P.O. (1)	0·42	0·55	0·62
				12	6" Q.F.	67	53	1	6·47	5·10	67·93	C. Rich, P.O. (2)	6·92	4·67	5·10
15	Illustrious	1st	58·77	4	12" Mark VIII.	9	2	1	1·80	0·50	14·21	C. Bounton, P.O. (1)	1·20	0·91	0·50
				12	6" Q.F.	68	43	2	7·66	4·97	66·20	W. Gale, P.O. (2)	8·18	4·58	4·97
16	Superb	2nd	58·68	10	12" Mark X.	40	23	3	3·97	2·40	58·68	C. Peckham, P.O. (1)	2·29	2·62	2·40
17	Monmouth	1st	58·25	12	6" B.L. VII. (*b*)	62	37	4	7·32	4·69	58·25	H. Thomas, Crpl., R.M.L.I.	10·00	5·75	4·69
18	Inflexible	2nd	57·70	8	12" Mark X.	32	18	2	4·02	2·36	57·70	G. Hancock, P.O. (1)	2·20	..	2·36
				4	12" Mark X.	14	11	3	3·59	3·23	78·97	A. Cocks, P.O. (1)	2·61	0·91	3·23
19	Lord Nelson	2nd	56·93	8	9·2" Mark XI.	32	17	1	6·53	3·64	55·73	F. Spicer, Sgt., R.M.L.I.	3·14	1·38	3·64
				2	9·2" Mark XI.	11	3	5	3·57	1·81	37·32	W. Waters, L.S.	2·98	1·75	1·81
20	Bellerophon	2nd	56·72	10	12" Mark X.	40	21	2	4·20	2·32	56·72	G. Field, Sgt., R.M.L.I.	2·22	1·60	2·32
				4	12" Mark IX.	14	6	1	3·02	1·38	33·74	E. Steer, P.O. (1)	1·45	..	1·38
21	Commonwealth	1st	56·11	4	9·2" Mark X.	22	10	3	3·70	1·95	40·21	W. Harvey, P.O. (1)	2·65	..	1·95
				10	6" B.L. VII. (*a*)	52	37	4	7·17	5·39	66·94	J. Wightman, Gnr., R.M.A.	9·00	..	5·39
22	Powerful	1st	55·65	2	9·2" Mark VIII.	6	0	0	1·89	0·00	0·00	——	—	0·25	0·00
				16	6" Q.F.	90	54	2	7·53	4·70	62·60	P. Moody, P.O. (1).	9·00	2·69	4·70
23	Isis	2nd	55·27	11	6" B.L. VII. (*b*)	59	34	4	7·27	4·45	55·27	T. Gladman, A.B.	7·14	1·45	4·45
24	Sapphire	1st	54·93	12	4" Q.F.	68	40	2	10·63	6·47	54·93	J. Cook, Pte., R.M.L.I.	10·00	2·11	6·47
25	Queen	2nd	53·44	4	12" Mark IX.	13	4	1	2·89	0·97	27·56	A. Ireland, P.O. (2)	1·20	1·45	0·97
				12	6" B.L. VII. (*b*)	66	38	3	7·71	4·65	57·75	E. Rogers, C.P.O.	7·95	2·50	4·65
26	Minotaur	1st	53·19	4	9·2" Mark XI.	15	9	3	4·63	3·30	50·52	H. Lang, P.O. (1)	2·30	3·00	3·30
				10	7·5" B.L.	57	31	0	5·97	3·25	53·72	W. Rogers, L.S.	7·20	2·69	3·25
27	Kent	1st	52·66	12	6" B.L. VII. (*b*)	63	31	12	7·17	4·24	52·66	F. Smith, Pte., R.M.L.I.	7·32	5·58	4·24
28	Brilliant	1st	52·52	2	6" Q.F.	12	10	0	6·00	5·00	66·60	F. Martinmas, P.O. (1)	5 00	2·00	5·00
				6	4·7" Q.F.	34	19	0	7·72	4.52	47·82	A. Andrews, P.O. (1)	10·29	2·17	4·52
29	Juno	2nd	52·29	11	6" B.L. VII. (*b*)	65	30	5	8·39	4·21	52·29	E. Bearne, A.B.	6·74	3·82	4·21
30	Exmouth	2nd	51·57	4	12" Mark IX.	15	3	1	3·29	0·77	21·88	T. Purkis, P.O. (1).	1·93	1·09	0·77
				12	6" B.L. VII. (*b*)	66	31	9	8·21	4·55	56·51	C. Bulleck, P.O. (1)	9·20	5·25	4·55
31	Speedwell	1st	50·36	2	4·7" Q.F.	12	6	0	9·51	4·76	50·36	J. Hoddell, L.S.	4·95	..	4·76
*31a	Britomart	1st	50·01	2	4" Q.F.	12	6	0	11·66	5·89	50·01	E. Sheppard, P.O. (2)	8·00	5·33	5·89
32	Warrior	2nd	49·89	6	9·2" Mark X.	32	19	0	3·73	2·29	47·22	J. Reeve, P.O. (1)	3·95	2·25	2·29
				4	7·5" B.L.	24	12	1	6·23	3·26	53·89	F. Spackman, A.B.	4·82	3·43	3·26

(*a*) = ⅓ charge. (*b*) = ½ charge. * Return received too late for insertion in compiled list by Admiralty.
† Ricochet hits counting half a hit. Not directly comparable with 1909.

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Results of Test of Gunlayers with Heavy Guns—*continued.*

Order of Merit.	Ship.	Whether 1st or 2nd Firing.	Points.	No. of Men Firing.	Guns.	Rounds.	Total Number of Hits. Direct.	Total Number of Hits. Ricochet.	Rounds per minute.	Hits per minute.	Points per Gun or Turret.	Best Shot in Ship.	Hits per minute by Best Shot.	Comparison with previous year. Hits per minute, 1909.	Comparison with previous year. Hits per minute, 1910.
33	Cæsar	1st	49·76	2	12" Mark VIII.	7	2	0	2·90	0·83	23·58	A. Deeble, P.O. (1)	1·60	0·55	† 0·83
				12	6" Q.F.	65	43	2	5·68	3·90	51·95	G. Parker, P.O. (1)	7·14	3·83	3·90
34	Hermione	1st	49·55	2	6" Q.F.	11	8	1	7·50	6·08	80·99	J. McLoughlin, Cpl., R.M.L.I.	9·17	..	6·08
				8	4·7" Q.F.	46	20	2	8·46	39·4	41·69	W. Barnes, L.S.	7·27	..	3·94
35	Russell	1st	48·14	4	12" Mark IX.	13	6	3	2·60	1·50	42·62	G. Marshall, C.P.O.	2·40	1·09	1·50
36	Bellona	1st	48·06	12	6" B.L. VII. (*b*)	54	33	5	5·99	3·95	49·06	F. Ford, L.S.	6·67	5·33	3·95
37	Black Prince	1st	47·81	6	4" B.L. VII.	34	15	2	10·92	5·31	48·06	J. Flynn, C.P.O.	10·80	—	5·31
				6	9·2" Mark X.	34	18	2	3·87	2·20	45·34	E. Flaye, Sgt., R.M.A.	4·03	3·08	2·20
				10	6" B.L. XI.	47	28	3	6·48	4·11	49·28	T. Palfryman, Sgt., R.M.A.	8·48	4·40	4·11
38	Prince George	1st	47·72	4	12" Mark VIII.	10	3	1	2·07	0·72	17·60	P. Norton, P.O. (1)	1·03	..	0·72
				12	6" Q.F.	70	40	3	6·69	3·96	52·75	O. Crassley, P.O. (1)	6·84	..	3·96
39	Achilles	2nd	47·58	6	9·2" Mark X.	34	18	4	4·31	2·52	51·96	A. Bailey, P.O. (1)	4·27	1·75	2·52
				4	7·5" B.L.	17	8	2	4·16	2·48	40·99	P. Archdeacon, L.S.	4·80	3·00	2·48
40	Eclipse	1st	47·28	5	6" Q.F.	28	17	0	6·09	3·73	49·68	W. Chandler, P.O. (1)	5·17	2·20	3·73
				6	4·7" Q.F.	34	20	1	7·11	4·28	45·28	W. Reeves, A.B.	6·38	3·17	4·28
41	Defence	2nd	46·38	4	9·2" Mark XI.	13	4	0	3·75	1·16	23·92	T. Jordan, Sgt., R.M.A.	1·74	2·25	1·16
				10	7·5" B.L.	58	30	6	5·79	3·35	55·38	J. Davis, A.B.	6·80	3·09	3·35
42	Challenger	2nd	46·33	11	6" B.L. VII. (*b*)	60	29	3	7·34	3·73	46·33	E. Place, A.B.	5·33	4·82	3·73
43	Diana	2nd	45·83	11	6" B.L. VII. (*b*)	57	27	5	7·15	3·69	45·83	A. Membry, P.O. (1)	6·00	4·36	3·69
44	Agamemnon	1st	44·91	4	12" Mark X.	13	8	1	2·69	1·76	43·03	R. Cameron, L.S.	1·29	1·64	1·76
				8	9·2" Mark XI.	32	18	3	5·25	3·08	47·15	G. Sheppard, P.O. (1)	2·67	2·38	3·08
				2	9·2" Mark XI.	10	6	1	3·16	2·05	42·27	H. Ryan, P.O. (1)	2·53	2·50	2·05
45	Africa	2nd	44·36	4	12" Mark IX.	16	11	0	4·32	2·97	72·62	A. White, P.O. (1)	2·16	1·27	2·97
				4	9·2" Mark X.	24	14	1	4·39	2·68	55·26	T. Staines, P.O.	4·04	2·38	2·68
46	Dido	2nd	44·59	10	6" B.L. XI.	36	21	0	4·98	2·93	35·13	J. Hart, Gnr., R.M.A.	8·09	3·50	2·93
				11	6" B.L. VII. (*b*)	54	27	4	6·68	3·59	44·59	W. Smith, P.O. (1)	7·53	4·09	3·59

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47	Hindustan . . .	1st	44·40	4	12″ Mark IX. .	16	9	1	3·95	2·34	57·21	T. Lee, A.B. . . .	1·65	..	2·34
				4	9·2″ Mark X. .	21	10	0	3·32	1·58	32·58	H. Webber, P.O. (2) .	2·53	..	1·58
				10	6″ B.L. VII. (*b*)	57	25	0	8·48	3·75	46·58	C. Cannaway, P.O. (2)	6·49	..	3·75
48	Duncan . . .	1st	44·35	4	12″ Mark IX. .	11	2	3	2·32	0·75	21·31	F. Redman, C.P.O. .	1·71	0·91	0·75
				12	6″ B.L. VII. (*b*)	61	30	8	6·92	3·88	48·19	E. Steventon, Gnr., R.M.A.	8·82	4·50	3·88
49	Forte	2nd	43·90	2	6″ Q.F. . . .	8	5	0	4·00	2·50	33·30	R. Ansell, P.O. (1) . .	4·00	3·50	2·50
				8	4·7″ Q.F. . .	48	23	3	8·36	4·40	46·55	A. Gosling, P.O. . .	9·23	2·88	4·40
50	Cochrane . . .	2nd	43·72	6	9·2″ Mark X. .	34	22	0	3·68	2·39	49·28	A. Dearing, Bom., R.M.A.	4·07	2·75	2·39
				4	7·5″ B.L. . .	22	8	3	4·99	2·14	35·37	C. Hancock, P.O. (1) .	4·38	2·14	2·14
51	Argyll	1st	43·64	4	7·5″ B.L. . .	20	13	3	4·58	3·32	54·88	W. Ewart, P.O. (1) .	4·04	3·57	3·32
				6	6″ B.L. VII. (*a*)	28	11	4	6·27	2·91	36·14	J. Riddle, P.O. (1) . .	5·58	2·83	2·91
52	Talbot	2nd	43·59	11	6″ B.L. VII. (*b*)	61	25	5	7·76	3·51	43·59	C. Long, P.O. (1) . .	7·32	3·91	3·51
53	Hogue	1st	43·44	2	9·2″ Mark X. .	11	5	1	3·60	1·81	37·32	A. Dench, C.P.O. . .	2·35	..	1·81
				12	6″ B.L. VII. (*b*)	59	29	5	6·75	3·58	44·46	F.Masters,Sgt.,R.M.L.I.	8·18	..	3·58
54	Devonshire . .	1st	43·25	4	7·5″ B.L. . .	20	3	2	5·02	1·02	16·86	A. Leworthey, P.O. (2)	2·26	2·14	1·02
				6	6″ B.L. VII. (*a*)	28	20	0	6·77	4·90	60·86	A.Boxall,Sgt ,R.M.L.I.	8·02	3·83	4·90
55	London . . .	1st	43·24	4	12″ Mark IX. .	14	2	1	2·93	0·53	15·06	F. Brush, C.P.O. . .	0·92	..	0·53
				12	6″ B.L. VII. (*b*)	60	31	2	7·16	3·86	47·94	W. Cockerill, P.O. (1) .	6·84	..	3·86
56	Antrim	1st	43·21	4	7·5″ B.L. . .	23	12	1	6·08	3·29	54·38	C. Jarvis, P.O. (1) . .	5·56	2·57	3·29
				6	6″ B.L. VII. (*a*)	30	12	1	6·86	2·88	35·77	J. Chitty, Pte., R.M.L.I.	7·14	3·67	2·88
57	Bulwark . . .	1st	42·87	4	12″ Mark IX. .	16	12	0	3·76	2·80	79·55	R. Watkins, P.O. (1) .	3·81	1·09	2·80
				12	6″ B.L. VII. (*b*)	60	24	3	6·93	2·96	36·76	L. Lowey, P.O. (1) .	6·89	4·08	2·96
58	Magnificent . .	1st	42·81	4	12″ Mark VIII.	12	6	0	2·48	1·24	30·32	H. Turner, C.P.O. . .	1·24	1·45	1·24
				12	6″ Q.F. . . .	61	39	1	5·21	3·37	44·89	W. Weston, L.S. . .	5·52	4·33	3·37
59	Dreadnought . .	2nd	42·79	10	12″ Mark X. .	35	16	5	3·43	1·75	42·79	E. Diaper, L.S. . .	1·73	2·47	1·75
60	Aboukir . . .	2nd	41·61	2	9·2″ Mark X. .	9	2	1	2·84	0·79	16·29	W. Bowden, P.O. (2) .	0·94	1·25	0·79
				12	6″ B.L. VII. (*b*)	64	31	3	7·31	3·69	45·83	W. Jenkins, P.O. (2) .	8·18	2·92	3·69
61	Flora	1st	41·51	2	6″ Q.F. . . .	12	6	2	6·98	4·08	54·35	R. Eggleton, P.O. (1) .	4·78	..	4·08
				8	4·7″ Q.F. . .	48	18	4	8·78	3·62	38·30	F. Laughrin, A.B. . .	6·92	..	3·62
62	Diamond . . .	1st	40·84	12	4″ Q.F. . . .	62	30	2	9·37	4·81	40·84	T. Webster, P.O. (1) .	10·07	..	4·81
	Leda	2nd	40·84	2	4·7″ Q.F. . .	11	6	0	6·92	3·86	40·84	E. Foster, C.P.O. . .	6·52	1·00	3·86
64	Scylla	2nd	40·39	2	6″ Q.F. . . .	7	1	0	3·50	0·50	6·66	J. Adams, L.S. . . .	1·00	1·00	0·50
				6	4·7″ Q.F. . .	35	19	2	8·22	4·88	51·63	F. Rust, L.S. . . .	8·68	3·67	4·88
65	Hyacinth . . .	2nd	40·09	11	6″ Q.F. . . .	64	29	2	6·82	3·01	40·09	F. Phelps, L.S. . .	5·51	2·91	3·01
66	Collingwood . .	1st	39·85	10	12″ Mark XI. .	32	19	1	2·67	1·63	39·85	A. Johnson, C.P.O. .	1·50	..	1·63

(*a*) = ¾ charge. (*b*) = ½ charge.
† Ricochet hits counting half a hit. Not directly comparable with 1909.

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RESULTS OF TEST OF GUNLAYERS WITH HEAVY GUNS—*continued.*

Order of Merit.	Ship.	Whether 1st or 2nd Firing.	Points.	No. of Men Firing.	Guns.	Rounds.	Total Number of Hits. Direct.	Total Number of Hits. Ricochet.	Rounds per minute.	Hits per minute.	Points per Gun or Turret.	Best Shot in Ship.	Hits per minute by Best Shot.	Comparison with previous year. Hits per minute, 1909.	Comparison with previous year. Hits per minute, 1910.
															†
67	Charybdis	1st	39·26	2	6″ Q.F.	12	6	1	6·70	3·65	48·62	A.Taylor,Pte.,R.M.L.I.	3·82	3·50	3·65
				8	4·7″ Q.F.	48	20	..	8·36	3·49	36·92	J. Wiltshire, L.S.	5·71	2·88	3·49
68	Seagull	2nd	38·93	2	4·7″ Q.F.	11	4	3	7·25	3·68	38·93	E. Belcher, C.P.O.	4·95	3·00	3·68
69	Doris	1st	38·38	11	6″ B.L. VII. (*b*)	56	22	4	7·11	3·09	38·38	R.Cook,L.Sgt.,R.M.L.I.	7·89	4·82	3·09
70	New Zealand	2nd	38·21	4	12″ Mark IX.	14	8	0	3·42	2·05	50·12	R. Glass, L.S.	1·80	0·55	2·05
				4	9·2″ Mark X.	23	11	3	4·16	2·25	46·40	A. Robertson, A.B.	3·89	1·50	2·25
				10	6″ B.L. VII. (*a*)	50	17	2	7·10	2·62	32·54	A. Waterton, Gnr., R.M.A.	5·45	3·90	2·62
71	Hampshire	2nd	37·35	4	7·5″ B.L.	24	10	2	5·52	2·55	42·15	H. Barnley, P.O. (1)	4·54	1·71	2·55
				6	6″ B.L. VII. (*a*)	26	12	0	5·95	2·75	34·16	J. Tidbury, A.B.	5·33	4·00	2·75
72	Duke of Edinburgh	1st	36·65	6	9·2″ Mark X.	32	18	0	3·95	2·22	45·78	S. Short, P.O. (1)	3·81	2·17	2·22
				10	6″ B.L. XI.	48	18	3	6·43	2·60	31·17	J.Burley,Bomb.,R.M.A.	5·32	3·40	2·60
73	Halcyon	2nd	36·50	2	4·7″ Q.F.	10	5	1	6·30	3·45	36·50	G. Holmes, P.O. (1)	3·60	0·50	3·45
74	King Edward VII.	2nd	36·49	4	12″ Mark IX.	15	5	0	3·10	1·03	25·18	H. Hatton, P.O. (1)	1·00	1·45	1·03
				4	9·2″ Mark X.	24	15	2	5·04	3·41	70·31	A. Chetwood, P.O. (1)	4·40	3·25	3·41
				10	6″ B.L. VII. (*a*)	45	14	1	6·14	2·03	25·21	W. Pope, Corp., R.M.A.	7·23	3·90	2·03
75	Formidable	2nd	36·47	4	12″ Mark IX.	14	7	0	2·98	1·51	42·90	F. Stephens, P.O. (1)	2·95	0·36	1·51
				12	6″ B.L. VII. (*b*)	58	23	5	6·52	2·85	35·40	E. Langley, P.O. (1)	5·33	2·33	2·85
	Roxburgh	1st	36·47	4	7·5″ B.L.	19	4	0	4·07	0·86	14·22	A. Sutton, L.S.	1·71	..	0·86
				6	6″ B.L. VII. (*a*)	34	16	3	7·94	4·13	51·29	G. Miller, C.P.O.	6·00	..	4·13
77	Thistle	1st	36·34	2	4″ Q.F.	10	5	0	8·57	4·28	36·34	J. Taylor, P.O. (1)	6·86	3·33	4·28
78	Encounter	1st	36·27	11	6″ B.L. VII. (*b*)	55	20	7	6·89	2·92	36·27	J.Denial,Pte.,R.M.L.I.	5·65	5·36	2·92
79	Circe	2nd	35·97	2	4·7″ Q.F.	11	5	1	7·00	3·40	35·97	C. Gerry, P.O. (1)	4·80	0·00	3·40
80	Shannon	1st	35·59	4	9·2″ Mark XI.	14	6	1	4·08	1·91	29·24	C. Thompson, L.S.	1·77	1·75	1·91
				10	7·5″ B.L.	52	23	1	4·99	2·23	36·86	W. Asker, P.O. (1)	4·14	2·17	2·23
81	Lancaster	1st	35·27	12	6″ B.L. VII. (*b*)	50	24	3	5·57	2·84	35·27	G. Wardell, Corp., R.M.L.I.	5·33	4·08	2·84

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*81a	Inflexible . . . (*New Commission*)	1st	35·21	8	12″ Mark X. .	29	11	4	3·16	1·44	35·21	H.Barlow,Corp.,R.M.A.	1·50	2·36	1·44
82	Swiftsure . . .	2nd	35·03	4	10″ B.L. . .	13	5	1	2·47	1·06	30·28	J.Thundercliffe,P.O.(1)	2·50	0·50	1·06
				14	7·5″ B.L. . .	65	34	0	4·21	2·16	35·70	W.Emeny,Sgt.,R.M.A.	4·60	1·31	2·16
83	Suffolk . . .	1st	35·02	12	6″ B.L. VII. (*b*)	60	24	2	6·73	2·82	35·02	W. Ley, P.O. (2) . .	6·89	4·00	2·82
84	Implacable . .	2nd	34·09	4	12″ Mark IX. .	15	5	3	3·19	1·37	38·92	S. Hammond, A.B. .	1·90	0·36	1·37
				12	6″ B.L. VII. (*b*)	55	22	2	6·30	2·68	33·29	M. Bryan, P.O. (1) .	6·32	1·92	2·68
85	Minerva . . .	2nd	33·91	11	6″ B.L. VII. (*a*)	58	20	3	7·24	2·73	33·91	A.Foster,Pte.,R.M.L.I.	7·59	3·27	2·73
*85a	Amethyst . . .	2nd	33·79	12	4″ Q.F. . . .	56	26	3	8·00	3·98	33·79	J. Taylor, P.O. (2) . .	10·91	3·11	3·98
86	Bacchante . . .	1st	33·52	2	9·2″ Mark X. .	10	4	0	3·16	1·26	25·98	W. Henley, P.O. (1) .	1·89	1·25	1·26
				12	6″ B.L. VII. (*b*)	52	23	4	5·83	2·80	34·78	C.Looker,Bomb.,R.M.A.	6·03	4·33	2·80
87	Triumph . . .	2nd	33·25	4	10″ B.L. . .	13	1	1	2·50	0·28	8·00	G. Harding, P.O. (1) .	0·75	0·50	0·28
				14	7·5″ B.L. . .	79	31	3	5·47	2·23	36·86	L. Sparks, P.O. (1) .	6·20	2·04	2·23
88	Melpomene . .	1st	32·75	2	6″ Q.F. . . .	12	6	0	7·51	3·90	51·95	E. Rawlinson, Pte., R.M.L.I.	5·58	3·00	3·90
				6	4·7″ Q.F. . .	26	10	1	6·03	2·49	26·34	H.Stone,Sgt.,R.M.L.I.	6·00	2·33	2·49
‡89	Pyramus . . .	1st	32·52	8	4″ Q.F. . . .	54	23	0	9·00	3·83	32·52	A. Deem, A.B. . . .	10·67	2·83	3·83
90	Pioneer . . .	1st	30·56	8	4″ Q.F. . . .	38	15	3	8·26	3·60	30·56	S. Steel, A.B. . . .	7·50	3·50	3·60
*90a	Invincible . . .	2nd	30·32	8	12″ Mark X. .	28	10	4	2·90	1·24	30·32	J. Chapman, Pte., R.M.L.I.	1·57	1·09	1·24
91	Prometheus . .	2nd	30·22	8	4″ Q.F. . . .	42	12	6	9·45	3·56	30·22	G. Davis, P.O. (1) . .	7·24	3·33	3·56
92	Hibernia . . .	2nd	30·15	4	12″ B.L. . .	15	4	0	3·36	0·86	21·03	J. Roberts, A.B. . .	0·98	0·73	0·86
				4	9·2″ B.L. X. .	23	9	1	4·76	2·14	44·13	J. Sandbach, P.O. (1) .	5·16	2·00	2·14
				10	6″ B.L. XI. .	47	16	1	6·27	2·20	26·38	E. Armstrong, A.B. .	4·00	4·60	2·20
93	Psyche	1st	29·72	8	4″ Q.F. . . .	42	14	2	9·29	3·50	29·72	W. Alford, P.O. (2) .	8·57	5·00	3·50
*93a	Gloucester . . .	1st	29·19	2	6″ B.L. XI. .	9	3	0	6·00	2·00	23·98	A. Down,Sgt.,R.M.L.I.	2·67	..	2·00
				10	4″ B.L. . . .	43	19	1	7·37	3·43	30·23	W. Edwards, L.S. . .	8·57	..	3·43
94	Venerable . . .	1st	28·33	4	12″ Mark IX. .	12	2	1	2·48	0·52	12·71	G. Wood, P.O. (2) . .	0·83	..	0·52
				12	6″ B.L. VII. (*b*)	49	18	7	5·55	2·49	30·93	W. Berch, L.S. . . .	9·23	..	2·49
95	Carnarvon . . .	1st	28·04	4	7·5″ B.L. . .	17	7	2	3·68	1·74	28·76	J. Brace, P.O. (1) . .	3·97	2·43	1·74
				6	6″ B.L. VII. (*a*)	18	9	2	4·00	2·22	27·57	J.Windle,Pte.,R.M.L.I.	3·33	4·50	2·22
96	Medea	2nd	27·72	6	4·7″ Q.F. . .	28	10	1	6·53	2·62	27·72	W. Finch, A.B. . .	6·67	4·83	2·62
97	Furious . . .	2nd	27·44	10	6″ Q.F. . . .	50	18	3	5·37	2·06	27·44	W. Hawkins, A.B. . .	4·00	3·10	2·06
98	Invincible . . .	1st	26·65	8	12″ Mark X. .	19	10	1	1·97	1·09	26·65	C. Metcalf, Corp., R.M.L.I.	1·24	..	1·09
99	St. Vincent . .	1st	25·92	10	12″ Mark XI. .	38	11	1	3·53	1·06	25·92	C. Vooght, C.P.O. . .	1·03	..	1·06
100	Vanguard . . .		25·43	10	12″ Mark XI. .	31	11	2	2·72	1·04	25·43	L. Sholbrook, P.O. (1)	1·62	..	10· 4

(*a*) = ½ charge. (*b*) = ⅓ charge.

* Returns received too late for insertion in compiled list by Admiralty. † Ricochet hits counting half a hit. Not comparable with 1909. ‡ Fired under 1909 conditions.

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Results of Test of Gunlayers with Heavy Guns—*continued.*

Order of Merit.	Ship.	Whether 1st or 2nd Firing.	Points.	No. of Men Firing.	Guns.	Rounds.	Total Number of Hits. Direct.	Total Number of Hits. Ricochet.	Rounds per minute.	Hits per minute.	Points per Gun or Turret.	Best Shot in Ship.	Hits per minute by Best Shot.	Comparison with previous year. Hits per minute, 1909.	Comparison with previous year. Hits per minute, 1910.
				4	12" Mark IX.	12	3	1	2·48	0·72	17·60	J. Roebuck, P.O. (1)	0·41	1·45	† 0·72
101	Dominion	1st	25·28	4	9·2" Mark X.	19	9	1	2·89	1·54	31·75	H. King, P.O. (2)	1·98	1·75	1·54
				10	6" B.L. VII. (*a*)	43	13	2	5·94	1·95	24·22	G. Silby, C.P.O.	6·81	5·70	1·95
				4	12" Mark IX.	15	6	1	3·16	1·38	39·21	W. Long, P.O. (1)	2·50	0·36	1·38
102	Prince of Wales	2nd	24·98	12	6" B.L. VII. (*b*)	61	13	6	7·02	1·82	22·60	J. Butcher, P.O. (2)	5·58	2·83	1·82
				2	6" B.L. XI.	8	3	0	5·34	2·00	23·98	G. Parry, P.O. (2)	4·00	..	2·00
*102a	Liverpool	1st	24·66	10	4" B.L.	45	15	2	7·72	2·74	24·80		..	..	2·74
103	Shearwater	2nd	24·37	6	4" Q.F.	32	9	1	9·63	2·87	24·37	H. Bourne, A.B.	4·00	3·11	2·87
104	Clio	2nd	24·28	6	4" Q.F.	32	6	3	11·35	2·86	24·28	T. Blondell, A.B.	5·88	4·00	2·86
105	Barham	2nd	24·12	6	4·7" Q.F.	34	10	1	7·42	2·28	24·12	P. Smith, P.O. (1)	4·29	0·83	2·28
106	Boadicea	2nd	23·26	6	4" B.L. VII.	27	9	0	7·71	2·57	23·26	J. Street, L.S.	6·86	1·56	2·57
107	Cumberland	1st	22·98	12	6" B.L. VII. (*b*)	54	15	3	6·02	1·85	22·98	W. Endacott, P.O. (1)	6·00	4·92	1·85
108	Cambrian	1st	22·37	2	6" Q.F.	9	2	1	4·50	1·25	16·65	A. Lawton, P.O. (1)	2·00	..	1·25
				8	4·7" Q.F.	44	13	2	7·03	2·25	23·81	R. Beavis, L.S.	5·22	..	2·25
109	Bramble	1st	21·82	2	4" Q.F.	10	3	0	8·57	2·57	21·82	F. Perrett, A.B.	3·43	7·33	2·57
110	Pandora	2nd	21·23	8	4" Q.F.	41	11	1	8·93	2·50	21·23	A. Delbridge, P.O. (1)	6·86	4·17	2·50
*110a	Hebe	1st	20·84	2	4·7" Q.F.	8	2	0	6·61	1·97	20·84	J. Laity, L.S.	2·61	..	1·97
111	Jason	2nd	20·00	2	4·7" Q.F.	10	3	0	6·18	1·89	20·00	A. Thomas, C.P.O.	3·78	2·50	1·89
				4	12" Mark IX.	12	1	2	2·40	0·40	11·36	E. Foster, P.O. (1)	0·80	0·91	0·40
112	Albemarle	1st	19·93	12	6" B.L. VII. (*b*)	55	13	5	6·11	1·72	21·36	H. Hart, A.B.	4·67	6·17	1·72
113	Algerine	1st	18·51	4	4" Q.F.	22	5	0	9·51	2·18	18·51	J. Shanahan, P.O. (2)	5·29	4·33	2·18
*113a	Indomitable	1st	17·60	8	12" Mark X.	22	6	2	2·27	0·72	17·60	J. Staines, P.O. (1)	1·48	1·45	0·72
114	Cadmus	1st	16·13	6	4" Q.F.	31	6	1	9·03	1·90	16·13	S. Lambert, C.P.O.	4·41	4·67	1·90
115	Speedy	1st	15.87	2	4·7" Q.F.	11	2	1	6·60	1·50	15·87	W. Cockrell, P.O. (1)	1·80	..	1·50
116	Skipjack	2nd	14·39	2	4·7" Q.F.	10	2	0	6·47	1·36	14·39	G. Venning, L.S.	2·71	3·00	1·36
117	Spanker	2nd	12·80	2	4·7" Q.F.	12	2	0	7·22	1·21	12·80	A. Goldsack, P.O. (1)	2·41	4·00	1·21

(*a*) = ¾ charge. (*b*) = ½ charge.

* Returns received too late for insertion in compiled list by Admiralty.

† Ricochet hits counting half a hit. Not directly comparable with 1909.

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Ricochet hits counting half a hit. Not directly comparable with 1909.

Gun.	Best Ship.	Total Number of				Average per minute.	
		Guns.	Rounds.	Hits. Direct.	Hits. Ricochet.	Rounds.	Hits.
12-in.	Temeraire (Home, 1st Div.).	5*	37	29	3	4·09	3·35
Totals 1910.		102*	706	314	54	3·02	1·43
,, 1909.		84*	659	296	..	2·85	1·28
Difference		+18	+47	+18	..	+0·17	+0·15
9·2-in., Mark XI.	Lord Nelson (Home, 1st Div.)	4*	32	17	1	6·53	3·64
Totals 1910.		14*	106	54	8	4·84	2·61
,, 1909.		14*	125	58	..	4·46	2·07
Difference		Nil	−19	−4	..	+0·38	+0·54
9·2-in., Marks X. & XI.	Natal (Home, 2nd Div.).	6	36	29	2	5·44	4·47
Totals 1910.		80	444	247	28	3·92	2·28
,, 1909.		78	573	361	..	3·67	2·31
Difference		+2	−129	−114	..	+0·25	−0·03
7·5-in.	Natal (Home, 2nd Div.).	4	20	17	2	5·94	5·32
Totals 1910.		98	517	244	28	5·11	2·61
,, 1909.		94	787	406	..	4·78	2·46
Difference		+4	−270	−182	..	+0·32	+0·14
6-in., Mark XI.	Britannia (Home, 2nd Div.)	10	55	45	2	8·34	7·02
Totals 1910.		50	233	128	9	6·50	3·77
,, 1909.		50	360	210	Nil	7·20	4·20
Difference		Nil	−127	−82	..	−0·70	−0·42
6-in., Marks VII. & VIII.	Cornwall (Special service tender)	12	66	48	3	7·70	5·75
Totals 1910.		453	2266	1046	172	6·90	3·47
,, 1909.		466	3475	2006	..	7·43	4·30
Difference		−13	−1209	−960	..	−0·53	−0·82
6-in. Q.F.	Hermione (Home, 3rd Div.)	2	11	8	1	7·50	6·08
Totals 1910.		179	1002	634	41	6·42	4·06
,, 1909.		234	1428	803	..	6·10	3·43
Difference		−55	−426	−169	..	+0·32	+0·63
4·7-in. Q.F.	Astræa (China)	8	48	28	4	10·05	6·42
Totals 1910.		102	571	245	27	7·50	3·34
,, 1909.		90	613	250	..	6·81	2·77
Difference		+12	−42	−5	..	+0·69	+0·56
4-in. Q.F.	Invincible (Home, 1st Div.).	16	89	67	2	11·66	8·95
Totals 1910.		134	739	336	38	9·80	4·26
,, 1909.		142	1022	510	..	9·59	4·78
Difference		−8	−283	−174	..	+0·21	−0·52
4-in. B.L.	Bellerophon (Home, 1st Div.)	16	90	55	5	11·17	7·26
Totals 1910.		120	593	266	29	9·02	4·27
,, 1909.		54	367	203	..	9·06	5·01
Difference		+66	+226	+63	..	−0·03	−0·74

* Turrets.

12-in., 1 run of 2½ minutes or 2 runs of 1¼ minutes per turret.
9·2-in., Marks X. and XII., 1 run of 1½ minutes.
6-in., Marks XI., VII., and VIII., 1 run of ¾ minute.
4·7-in. Q.F., 1 run of ⅔ minute.
9·2-in., Mark XI., 1 run of 1¾ minutes per turret.
7·5-in. B.L., 1 run of 1¼ minutes.
6-in. Q.F., 1 run of 1 minute.
4-in. Q.F. and B.L., 1 run of ½ minute.

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Abstract of Results of Battle Practice in H.M. Fleet, 1910.

Order of Merit.	Fleet.	No. of Ships.	No. of Guns.	Average Points.	First Ship in Fleet.	Score.
1	Australia	5	55	212·6	Pyramus . . .	333·2
2	3rd Division, Home Fleet	10	132	192·5	Carnarvon . . .	306·7
3	China	6	76	185·1	Minotaur . . .	430·9
4	2nd Division Home Fleet and 2nd Cruiser Squadron	14	202	184·0	Africa	313·9
5	1st Division Home Fleet and 1st Cruiser Squadron	11	122	179·6	Agamemnon . .	316·3
6	Atlantic and 5th Cruiser Squadron	9	135	159·6	Formidable . .	577·3
7	Mediterranean and 6th Cruiser Squadron	13	179	98·3	Bacchante . . .	191·1
	*Ships inside range .	0	—	—	—	—
	*Ships outside range.	6	90	93·6	St. Vincent . . .	195·3
	†Totals and averages	74	991	161·5		

Fired at Fixed Target.

1	Cape of Good Hope .	3	29	373·9	Hermes	560·7

* 800 yards or over.

† The conditions of the practice differed considerably from those of former years, so that no comparison can be made.

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French Navy Estimates, 1911.

(Converted at £1 = 25 francs.)

Cap. in Estimates, 1911.	Heads of Expenditure.	Credits voted* for 1911.	Credits voted for 1910.
	SECTION I.		
	General Expenses of Administration—Maintenance of the Navy.	£	£
1, 2, 3, 4	Admiralty Office	177,022	171,572
5, 6	Hydrographic Department	30,079	33,591
7	Inspection of Administrative Services	13,091	13,015
8, 9, 10, 11	Navy Pay, Officers and Men; Mess Allowance, Officers	2,570,287	2,533,945
12, 13	Justice and Police	100,459	95,817
14	Commissariat Staff	49,262	50,461
15, 16, 17	Storekeeper's Department — Wages and Materials	972,583	947,313
18, 19	Victualling Department — Wages and Materials	827,718	778,159
20, 21, 22	Medical and Hospitals	187,650	177,997
23	Constructors' Staff	202,299	199,158
24, 26	Shipbuilding—Maintenance and repair of Fleet; Wages	528,708	520,308
25, 27	Shipbuilding—Maintenance and repair of Fleet; Materials	751,120	751,160
28	Ordnance Staff	76,180	82,530
29, 31	Guns—Repairs and improvements, &c.; Wages	168,978	160,978
30, 32	Guns—Repairs and improvements, &c.; Materials	691,954	807,150
33, 34, 35	Hydraulic and other Works	154,237	147,046
36	Administrative Staff	164,508	158,502
37	Travelling and lodging allowances	151,744	153,264
38	Charitable and subscriptions	71,053	42,133
39	Pay of Reserve Officers	35,497	35,497
40	Secret Service	4,000	4,000
	SECTION II.		
41, 42, 43, 44	Mercantile Marine and Fisheries	121,263	124,470
45	Pensions	649,192	634,499
	Carried forward	£8,698,882	£8,622,545

* Chamber of Deputies, March, 1911.

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FRENCH NAVY ESTIMATES—*continued.*

Cap. in Estimates, 1911.	Heads of Expenditure.	Credits voted for 1911.	Credits voted for 1910.
		£	£
	Brought forward . .	8,698,882	8,622,545
	SECTION III. *New Construction, Guns, Works.*		
46	Sundry Stores	48,880	400
47	Shipbuilding in Dockyards—Wages .	547,240	527,640
48	,, ,, Materials .	1,988,000	1,262,610
49	,, by Contract . . .	2,531,200	2,207,000
50	Torpedoes and Mines	219,000	231,000
51	Machinery, large tools, and workshops .	358,280	247,060
52	New guns and renewals—Wages . .	110,665	98,285
53	,, ,, Materials . .	1,461,094	1,137,124
54	,, machinery, tools, and workshops	80,100	50,800
55, 56	New Works, including defence of military ports and bases of operations . .	611,280	638,520
		£16,654,621	£15,023,014

In a Preliminary Note to the French Navy Estimates for 1911 it is stated that they have been rearranged in a manner to make them more easily intelligible, and more readily controllable by Parliament. The most important innovation is a separate Section, corresponding to the nomenclature of the Army Estimates, showing the expenditure on new construction, guns, and works. (*Travaux neufs. Approvisionnements de guerre.*)

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PROGRAMME OF NEW CONSTRUCTION, TO BE CONTINUED OR UNDERTAKEN IN 1911.—BUILDING IN DOCKYARDS.

Class.	Names of Ships.	Where Building.	Date of Commencement.	Proposed Date of Completion.	Estimated Cost.	Probable Expenditure in 1911.
					£	£
Battleships	Danton	Brest	1908	1911	2,024,792	299,728
	Mirabeau	Lorient	1908	1911	2,014,193	329,813
	Jean Bart	Brest	1910	1913	2,603,960	840,000
	Courbet	Lorient	1910	1913	2,603,960	834,205
Armoured Cruisers, First-class	Edgar-Quinet	Brest	1905	1910	1,372,096	5,846
	Waldeck-Rousseau	Lorient	1906	1911	1,379,266	66,847
33 Submarines	Pluviose to Vendémiaire (9), Brumaire, Frimaire, Nivôse	Cherbourg	1906-1909	1908-1912	738,531	61,408
	Monge, Ampère, Gay-Lussac	Toulon	1906	1910-1911	197,700	1,130
	Foucault	Cherbourg	1910	1912	189,368	64,588
	Euler, Franklin					
	Mariotte		1908	1912	105,751	12,669
	Faraday, Volta, Newton, Mongolfier	Rochefort	1909-1910	1911-1912	261,469	71,974
	Amiral Bourgois		1908	1911	105,138	21,536
	Bernouilli, Joule, Coulomb, Arago, Curie, Le Verrier	Toulon	1908-1909	1912	432,111	105,887
	Charles Brun		1908	1911	83,910	4,772
	Q 90 & Q 91	Rochefort	1911	1913	138,918	40,288
Torpedo-boat Destroyers	M 81 & M 82	Toulon	1910-1911	1913	219,770	87,171
	M 83				105,277	23,816
	Enseigne Henry & Aspirant Herbert (*ex* M 84 & M 85)	Rochefort	1910	1913	152,400	82,116
Submarines, 750 tons	Q 92 & Q 93	Cherbourg	1911-1912	1913-1914	275,216	64,008
	Total building in Dockyards			.. ..	£15,003,851	3,017,302

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Programme of New Construction, to be continued or undertaken in 1911.—Building by Contract.

Class.	Names of Ships.	Where Building and to be Completed.	Date of Commencement.	Proposed Date of Completion.	Estimated Cost.	Probable Expenditure in 1911.
					£	£
Battleships	Voltaire	La Seyne—Toulon.	1906	1911	2,209,236	544,517
	Diderot	St. Nazaire—Brest.	1906	1911	2,205,497	473,670
	Condorcet	„ „	1906	1911	2,202,835	477,409
	Vergniaud	Bordeaux—Toulon.	1906	1912	2,203,321	501,286
Torpedo Boat Destroyers.	Janissaire	Rouen—Cherbourg.	1907	1910	80,172	3,846
	Cavalier	Le Havre—Cherbourg.	1907	1910	82,491	3,840
	Cimeterre	Bordeaux—Lorient.	1908	1911	109,949	54,189
	Dague	„ „	1908	1911	110,657	47,869
	Fourche	Nantes—Lorient	1908	1911	110,314	54,127
	Faulx	„ „	1908	1911	111,022	47,652
	Boutefeu	Bordeaux—Lorient	1908	1911	107,619	55,817
	Bouclier	Le Havre—Cherbourg.	1908	1911	120,522	60,269
	Casque	„ „	1908	1911	118,577	58,867
	Capitaine-Mehl	St. Nazaire—Lorient	1910	1912	125,023	34,305
	Dehorter	St. Nazaire—Cherbourg	1910	1912	125,823	34,305
	Francis Garnier	Soc-Normand—Cherbourg	1910	1912	127,423	26,305
	Commandant-Bory	Soc.-Dele & Bacalan—Lorient	1910	1912	120,423	34,305
	Commandant-Rivière	Soc.-De la Gironde—Lorient	1910	1912	120,423	26,305
	M 78 to 80	—	—	—	382,295	130,336
Surveying Vessel	Sonde	Deaux-Lacour—Cherbourg	1910	1911	3,211	1,731
Mine-layers	Pluton	Soc.-Normand—Cherbourg	—	—	71,973	44,885
	A²	—	—	—	71,973	34,400
	Total building by Contract				£10,920,779	2,750,235

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German Navy Estimates, 1911.

(*Converted at* £1 = 20·43 *marks.*)

Ordinary Permanent Estimates.

Heads of Expenditure.	Estimates for the financial year 1911.	Granted for the financial year 1910.
	£	£
Imperial Navy Office	111,700	109,591
Admiral Staff	16,091	16,006
Look-out Stations and Observatories	20,450	19,749
Station Superintendencies	42,532	41,524
Administration of Justice	10,544	10,767
Naval Chaplains and Garrison Schools	9,940	9,501
Navy Pay	1,910,010	1,780,927
Maintenance of Ships in Commission	2,282,623	2,118,134
Victualling	141,380	147,110
Clothing	24,370	22,253
Garrison Works and Administration	110,470	107,124
Lodging Allowance	204,303	199,692
Medical Department	158,648	150,396
Travelling Expenses, Freight Charges, &c.	196,808	174,781
Training Establishments	27,904	28,636
Maintenance of Fleet and Docks	1,797,346	1,784,988
Ordnance and Fortification	922,886	789,284
Accountants' Department	58,233	57,345
Pilotage, Coastguard, and Surveying Service	42,684	39,977
Miscellaneous Expenses	87,948	85,450
Total of Ordinary Permanent Estimates	£ 8,176,870	7,693,235
Administration of Kiau-chau Protectorate	7,800	7,915
Total carried to Summary, next page	£ 8,184,670	7,701,150

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Special Ordinary Estimates.

Shipbuilding Programme for the Financial Year 1911.

For the Construction of—	£
Battleship Ostfriesland, final instalment	230,054
„ Helgoland „	230,054
„ Thüringen „	230,054
Large cruiser Moltke (ex G), final instalment	252,080
Battleship Oldenburg (Ersatz Frithjof), 3rd instalment	293,686
„ Ersatz Hildebrand „	293,686
„ Ersatz Heimdall „	293,686
Large cruiser (H) „	391,580
Small cruiser Ersatz Bussard, final instalment	73,420
„ Ersatz Falke „	73,420
Battleship, Ersatz Hagen, 2nd instalment	513,954
„ Ersatz Ægir „	513,954
„ Ersatz Odin „	513,954
Large cruiser (J) „	538,420
Small cruiser Ersatz Cormoran, 2nd instalment	122,370
„ Ersatz Condor „	122,370
Torpedo nets „	132,160
Battleship Ersatz Kurfürst Friedrich Wilhelm, 1st instalment	269,210
„ Ersatz Weiszemburg „	269,210
„ S „	269,210
Large cruiser K „	244,738
Small cruiser, Ersatz Seeadler „	122,370
„ Ersatz Geier „	122,370
Three small surveying vessels, to replace others	7,340
Torpedo-boat division, final instalment	445,423
„ „ 1st instalment	489,476
Submarines, construction and trials	734,214
Alteration and improvement of battleships	53,842
„ „ large cruisers	53,842
„ „ small cruisers	14,684
Total	£7,914,831

Summary.

Heads of Expenditure.	Estimates for the financial year 1911.	Granted for the financial year 1910.
	£	£
Ordinary Permanent Estimates	8,184,670	7,701,150
New Construction and Alterations	7,914,831	7,715,125
Armaments, Torpedoes, and Mines	4,335,438	4,206,070
Other items	672,044	637,213
Extraordinary Expenditure	946,643	985,926
Total	£22,053,626	21,245,484

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Italian Navy Estimates, 1911-12.

FINANCIAL YEAR 1ST JULY, 1911, TO 30TH JUNE, 1912.

(Converted at £1 = 25 lire.)

Heads of Expenditure.	Estimates, 1911-1912.	Revised Estimates, 1910-1911.
ORDINARY GENERAL EXPENDITURE.	£	£
Admiralty	111,116	110,492
Pensions	346,300	323,020
Expenditure on the Mercantile Marine for subsidies, &c.	812,982	912,085
Total	£1,270,398	1,345,597
ORDINARY EXPENDITURE FOR NAVAL SERVICES.	£	£
General Staff of the Navy	179,600	180,000
Corps of Engineers	77,720	77,548
Medical Service	35,720	33,000
Commissariat Service	38,560	38,792
Pay of Officers, and Wages and Clothing of Men	628,796	630,204
Gratuities, &c.	168,000	172,000
Forts—*Personnel*	17,680	17,600
Telegraph Service—*Personnel*	15,160	15,000
" " *Matériel*	6,600	6,600
Police (Dockyards)	13,260	13,260
Salaries and Office Expenses	11,868	8,468
Barracks, Maintenance, Lighting, etc.	11,160	8,800
Rents and Water Royalties	3,000	2,624
Ships fitting out, &c.	306,504	304,040
Fuel and Stores for Ships in Commission	337,000	337,000
Victualling	422,536	408,736
Hospital Services	28,600	32,400
Naval College and Engineering School	17,988	17,748
Scientific Services—*Personnel*	7,400	5,000
" " *Matériel*	6,320	6,320
Wireless Telegraph Stations, Benadir and Eritrea	12,000	4,400
Workshops, Fortifications, and Stores—*Personnel*	74,918	73,640
Technical Department (Civil)—*Personnel*	39,240	39,280
Naval Constructors	25,720	25,720
Law Charges	1,344	1,344
Transport of Materials	8,600	8,600
Works Department—Repairs	100,000	101,720
Plant, Machinery and Tools; Reconstruction and maintenance of Workshops	70,000	70,000
Electric Power, Fuel and Stores for Shore Establishments	68,000	68,000
Materials for construction of new Ships and maintenance of existing Ships—Hulls, Machinery, and Armaments	2,341,302	2,151,206
Expenditure under law of 27th June, 1909, not relating to shipbuilding	400,000	200,000
Wages and Expenses of Dockyard employés	740,800	740,800
Guns, Torpedoes and Small Arms	124,800	124,800
Supernumerary Labour in Dockyards	32,000	32,000
Coast Defence—*Matériel*	12,000	12,000
Adaptation of Mercantile Auxiliaries	4,000	4,000
Reserve Fund	20,000	20,000
Total (to next page)	£6,408,226	5,992,650

The Estimates for 1911-12 provide for the continuation of battleships Dante Alighieri, Conte di Cavour, Giulio Cesare, Leonardo da Vinci, and various subsidiary vessels.

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ITALIAN NAVY ESTIMATES—*continued.*

Heads of Expenditure.	Estimates, 1911–1912.	Revised Estimates, 1910–1911.
EXTRAORDINARY EXPENDITURE.	£	£
Temporary Civil Staff	7,000	9,520
General Expenses and Half Pay	2,200	2,000
Repair of buildings at Messina and Reggio . . .	6,000	—
Total . . . £	15,200	11,520
SUMMARY.		
	£	£
Ordinary General Expenditure	1,270,398	1,345,597
„ Expenditure for Naval Services	6,408,226	5,992,650
Extraordinary Expenditure	15,200	11,520
Rent of Lands occupied by Government	108,670	108,659
Grand Total . . £	7,802,494	7,458,426

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Japanese Navy Estimates, 1911–1912.*

Ordinary Expenditure.

	1911–1912.	1910–1911.
	£	£
Admiralty	19,824	19,717
Pay and Allowances	1,243,500	1,219,059
Offices	45,077	45,312
Repairs to Buildings	26,390	26,390
Travelling	63,582	62,822
Miscellaneous	33,723	33,802
Allowances to Cadets and Petty Officers for Clothing	39,252	39,397
Clothing and Provisions	728,951	701,956
Shipbuilding, Armaments, and Repairs	1,166,778	1,035,224
Experimental Tank	1,011	1,011
Manœuvres	29,271	27,906
Hospital Expenses	26,508	24,597
Naval Harbours	39,887	39,887
Maintenance of Ships, Dockyards, etc.	621,088	575,926
Family Allowances to Petty Officers and Men	32,876	32,876
Prisoners	644	644
Hydrographic	27,386	27,326
Salaries to Foreigners	1,433	1,433
Secret Service	8,167	8,167
Maintenance	2,042	2,042
Miscellaneous Defrayments	2,134	2,134
	£4,159,524	£3,927,628

Extraordinary Expenditure.

	£	£
New Works and Repairs	60,369	33,657
Chinkai Naval Station	55,794	56,381
Repairs in Naval Dockyards to Ships not belonging to Navy	21,671	21,671
Naval Works Department	5,089	1,884
Making Charts	1,531	1,531
Armaments Replenishing Fund †	4,462,286	3,607,073
Making Naval Grounds in Corea	3,063	3,063
Magazine Cooling Arrangements	30,625	30,625
Salving parts of the Matsushima	3,063	3,063
Working Coal Mines	6,525	—
Writing History of the War	2,546	—
	£4,643,491	£3,768,019

Summary.

	£	£
Ordinary Expenditure	4,159,524	3,927,628
Extraordinary „	4,643,491	3,768,019
Total	£8,803,015	£7,695,647

* The Estimates are converted at the rate of 1 yen = 2*s*. 0½*d*. The figures supplied last year were converted at 2*s*.

† The three Funds, viz., "Naval Replenishing Fund," "Naval Repair Fund," and "Naval Hoju Fund," are combined under the one heading, "Armaments Replenishing Fund."

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Russian Navy Estimates, 1911.

Heads of Expenditure.	Estimates, 1911.	Net Estimates, 1910.
	£	£
Administration	332,598	328,258
Pay and Wages	1,411,024	1,334,252
Clothing	338,682	303,609
Victualling	587,609	561,559
Travelling Expenses and cost of Carriage	63,750	74,375
Postages and Telegrams	46,556	37,974
Ships in Commission and Reserve—		
Upkeep (Stores, Fuel, etc.)	881,555	786,358
Hydrographic, Buoying, and Lighting Services	518,473	470,015
Shipbuilding and Repairs	4,758,264	2,601,548
Armaments	1,249,522	1,274,197
Works	1,302,364	915,838
Medical and Hospital Services	157,215	153,260
Training Establishments and Educational Services	157,000	146,422
Courts-Martial and Prisons	20,302	20,275
Pensions and Insurances	140,140	110,863
Miscellaneous	45,585	44,990
Supplementary Vote for Baltic Fleet	—	318,750
Expenses arising out of Russo-Japanese War	191,612	241,035
Total	£12,197,251	9,723,573

Numbers—1st Jan., 1911 { Officers 2,961; Warrant Officers 1,080; Petty Officers and Men 43,293 } Total = 47,334.

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Turkish Navy Estimates, 1911.

Converted at £1 = 111 piastres.

SECTION I.

CENTRAL ADMINISTRATION, PERSONNEL.

	£	£
Minister of Marine, Under-Secretary of State, and Chief of Staff	3,000	
Pay of Officers and Men	310,379	
Civil Staff and Junior Officers	24,049	
Foreign Officers	10,746	
Naval Attachés	3,110	
Officers to be sent to Europe, 52 in number	19,690	
Contingent Expenditure	27,000	
Officers in European Shipbuilding Yards, 9 in number	2,000	
Staff of Naval School, Hade Hané Dockyard, and Naval Hospital	3,991	
Commodore	811	

PERMANENT CHARGES.

Victualling	268,873	
Clothing	56,660	

MISCELLANEOUS.

Travelling and other expenses	7,616	
Religion	383	
Wages of Permanent Staff of Workmen	27,387	
„ „ Temporary „ „	13,883	
Office Expenses, etc.	360	
Maintenance of Harbours at Constantinople and elsewhere	3,829	
Total, Section I.		783,767

SECTION II.

MAINTENANCE OF FLEET AND DOCKYARDS.

Sundry Stores	49,986	
Fuel and Oil	90,090	
Ammunition	97,748	
Customs Charges	2,702	
Electric Light	14,755	
Timber	4,628	
Medical Stores	2,856	
Repairs, Reconstruction, etc.	41,655	

MISCELLANEOUS.

Steamers, Motor Launches, Machinery for Electric Light, etc.	112,612	
Purchase of Floating Dock, etc.	70,015	
Reconstruction of Hospital	3,298	
Total, Section II.		490,345
Total Estimates		£1,274,112

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United States Navy Estimates, 1911-12.

(Converted at £1 = $4·8665, being par, as adopted by Congress.)

Objects of Expenditure and Appropriation.	Appropriation Bill, year ending June 30, 1912.	Appropriated for year ending June 30, 1911.
	£	£
Pay of the Navy	7,206,211	6,917,812
Pay, Miscellaneous	205,487	178,475
Contingent, Navy	9,453	15,617
Naval Station (for Lepers), Island of Guam	2,877	2,877
Bureau of Navigation	699,530	676,636
„ Ordnance	2,456,489	2,381,280
„ Equipment	1,731,900	1,651,762
„ Yards and Docks	322,614	271,242
Public Works under Bureau of Yards and Docks		1,337,907
Public Works under Secretary of Navy (Naval Academy)		31,152
Public Works under Bureau of Navigation (Training Stations and War College)	1,527,066	3,350
Public Works, Bureau of Ordnance		53,345
„ „ „ Equipment		2,055
„ „ „ Medicine and Surgery		30,825
„ „ Marine Corps		24,145
Bureau of Medicine and Surgery	90,825	82,503
„ Supplies and Accounts	1,669,373	1,677,812
„ Construction and Repair	1,766,392	1,872,196
„ Steam Engineering	1,313,881	1,302,931
Naval Academy	128,576	104,627
Marine Corps	1,515,042	1,443,962
Increase of Navy:—		
Construction and Machinery	2,780,597	3,986,595
Torpedo Boats, Submarines	398,813	432,544
Colliers	—	61,646
Armour and Armament	2,164,372	2,376,478
Equipment	—	82,092
Total	£25,989,498	£27,001,866

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Austro-Hungarian Navy Estimates, 1911-12.

(Converted at £1 = 24 Kronen.)

Heads of Expenditure.	Estimates, 1911-12.	Estimates, 1910-11.
ORDINARY ESTIMATES.	£	£
Pay of Officers, etc.	248,377	244,031
Pay and Clothing—petty officers and seamen	243,334	225,118
Land Service	122,336	115,501
Sea Service	355,380	302,194
Shore Establishments	35,643	33,723
Maintenance of Fleet	494,913	459,696
New Construction, viz.:—		
(A) Hulls and Machinery: Battleship Erzherzog Franz Ferdinand, 14,500 tons	137,500	250,000
(A) Hulls and Machinery: Battleship Radetsky, 14,500 tons	179,166	125,000
(A) Hulls and Machinery: Battleship Zrinyi, 14,500 tons	166,666	125,000
(A) Hulls and Machinery: Cruiser Admiral Spaun, 3,500 tons	8,333	41,667
(A) Hulls and Machinery: 12 Torpedo-boats, 100 tons	12,500	41,667
(B) Guns, torpedo fittings, &c., for above-named vessels	329,166	250,000
Guns and Small Arms	148,375	147,958
Miscellaneous	208,410	190,638
	2,690,099	2,552,193
Less Special Receipts	16,666	14,176
Total of Ordinary Estimates	2,673,433	2,538,017
EXTRAORDINARY ESTIMATES.		
Pay and Clothing, &c.	2,083	4,167
Shore Establishments, Charts, etc.	458	—
Floating-Dock	—	54,166
Large Alterations, Kaiserin M. Theresia, Erzherzog Albrecht, Habsburg, Lussin, Huszar and Floating Dock for Destroyers and Torpedo-boats	47,500	47,500
Guns and Small Arms, Torpedo Fittings, Mines, &c.	27,500	57,916
Buildings	90,008	65,533
Miscellaneous	3,066	14,250
	2,844,048	2,781,549
SINGLE EXTRAORDINARY ESTIMATE FOR THE YEAR 1911.		
Extraordinary Estimate for Final Development of the Fleet	2,291,666	—
	£5,135,714	£2,781,549

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DECLARATION OF LONDON CONCERNING THE LAWS OF NAVAL WAR.

His Majesty the German Emperor, King of Prussia; the President of the United States of America; His Majesty the Emperor of Austria, King of Bohemia, etc., and Apostolic King of Hungary; His Majesty the King of Spain; the President of the French Republic; His Majesty the King of the United Kingdom of Great Britain and Ireland and of the British Dominions beyond the Seas, Emperor of India; His Majesty the King of Italy; His Majesty the Emperor of Japan; Her Majesty the Queen of the Netherlands; His Majesty the Emperor of All the Russias.

Having regard to the terms in which the British Government invited various Powers to meet in conference in order to arrive at an agreement as to what are the generally recognized rules of international law within the meaning of Article 7 of the Convention of 18th October, 1907, relative to the establishment of an International Prize Court;

Recognizing all the advantages which an agreement as to the said rules would, in the unfortunate event of a naval war, present, both as regards peaceful commerce, and as regards the belligerents and their diplomatic relations with neutral Governments;

Having regard to the divergence often found in the methods by which it is sought to apply in practice the general principles of international law;

Animated by the desire to insure henceforward a greater measure of uniformity in this respect;

Hoping that a work so important to the common welfare will meet with general approval;

Have appointed as their Plenipotentiaries, that is to say:

His Majesty the German Emperor, King of Prussia:

M. Kriege, Privy Councillor of Legation and Legal Adviser to the Department for Foreign Affairs, Member of the Permanent Court of Arbitration.

The President of the United States of America:

Rear-Admiral Charles H. Stockton, retired;

Mr. George Grafton Wilson, Professor at Brown University and Lecturer on International Law at the Naval War College and at Harvard University.

His Majesty the Emperor of Austria, King of Bohemia, etc., and Apostolic King of Hungary:

His Excellency M. Constantin Théodore Dumba, Privy Councillor of His Imperial and Royal Apostolic Majesty, Envoy Extraordinary and Minister Plenipotentiary.

His Majesty the King of Spain:

M. Gabriel Maura y Gamazo, Count de la Mortera, Member of Parliament.

The President of the French Republic:

M. Louis Renault, Professor of the Faculty of Law at Paris, Honorary Minister Plenipotentiary, Legal Adviser to the Ministry of Foreign Affairs, Member of the Institute of France, Member of the Permanent Court of Arbitration.

His Majesty the King of the United Kingdom of Great Britain and Ireland, and of the British Dominions beyond the Seas, Emperor of India:

The Earl of Desart, K.C.B., King's Proctor.

His Majesty the King of Italy:

M. Guido Fusinato, Councillor of State, Member of Parliament, ex-Minister of Public Instruction, Member of the Permanent Court of Arbitration.

His Majesty the Emperor of Japan:

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Baron Toshiatsu Sakamoto, Vice-Admiral, Head of the Department of Naval Instruction.

M. Enjiro Yamaza, Councillor of the Imperial Embassy at London.

Her Majesty the Queen of the Netherlands:

His Excellency Jonkheer J. A. Roëll, Aide-de-Camp to Her Majesty the Queen in Extraordinary Service, Vice-Admiral retired, ex-Minister of Marine.

Jonkheer L. H. Ruyssenaers, Envoy Extraordinary and Minister Plenipotentiary, ex-Secretary-General of the Permanent Court of Arbitration.

His Majesty the Emperor of all the Russias:

Baron Taube, Doctor of Laws, Councillor to the Imperial Ministry of Foreign Affairs, Professor of International Law at the University of St. Petersburgh.

Who, after having communicated their full powers, found to be in good and due form, have agreed to make the present Declaration:—

Preliminary Provision.

The Signatory Powers are agreed that the rules contained in the following Chapters correspond in substance with the generally recognized principles of international law.

Chapter I.—Blockade in time of War.

Article 1.—A blockade must not extend beyond the ports and coasts belonging to or occupied by the enemy.

Article 2.—In accordance with the Declaration of Paris of 1856, a blockade, in order to be binding, must be effective—that is to say, it must be maintained by a force sufficient really to prevent access to the enemy coastline.

Article 3.—The question whether a blockade is effective is a question of fact.

Article 4.—A blockade is not regarded as raised if the blockading force is temporarily withdrawn on account of stress of weather.

Article 5.—A blockade must be applied impartially to the ships of all nations.

Article 6.—The commander of a blockading force may give permission to a warship to enter, and subsequently to leave, a blockaded port.

Article 7.—In circumstances of distress, acknowledged by an officer of the blockading force, a neutral vessel may enter a place under blockade and subsequently leave it, provided that she has neither discharged nor shipped any cargo there.

Article 8.—A blockade, in order to be binding, must be declared in accordance with Article 9, and notified in accordance with Articles 11 and 16.

Article 9.—A declaration of blockade is made either by the blockading Power or by the naval authorities acting in its name.

It specifies—

(1.) The date when the blockade begins;

(2.) The geographical limits of the coastline under blockade;

(3.) The period within which neutral vessels may come out.

Article 10.—If the operations of the blockading Power or of the naval authorities acting in its name, do not tally with the particulars, which, in accordance with Article 9 (1) and (2), must be inserted in the declaration of blockade, the declaration is void, and a new declaration is necessary in order to make the blockade operative.

Article 11.—A declaration of blockade is notified—

(1.) To neutral Powers, by the blockading Power by means of a communication addressed to the Governments direct, or to their representatives accredited to it;

(2.) To the local authorities, by the officer commanding the blockading force. The local authorities will, in turn, inform the foreign consular officers at the port or on the coastline under blockade as soon as possible.

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ARTICLE 12.—The rules as to declaration and notification of blockade apply to cases where the limits of a blockade are extended, or where a blockade is re-established after having been raised.

ARTICLE 13.—The voluntary raising of a blockade, as also any restriction in the limits of a blockade, must be notified in the manner prescribed by Article 11.

ARTICLE 14.—The liability of a neutral vessel to capture for breach of blockade is contingent on her knowledge, actual or presumptive, of the blockade.

ARTICLE 15.—Failing proof to the contrary, knowledge of the blockade is presumed if the vessel left a neutral port subsequently to the notification of the blockade to the Power to which such port belongs, provided that such notification was made in sufficient time.

ARTICLE 16.—If a vessel approaching a blockaded port has no knowledge, actual or presumptive, of the blockade, the notification must be made to the vessel itself by an officer of one of the ships of the blockading force. This notification should be entered in the vessel's logbook, and must state the day and hour, and the geographical position of the vessel at the time.

If through the negligence of the officer commanding the blockading force no declaration of blockade has been notified to the local authorities, or, if in the declaration, as notified, no period has been mentioned within which neutral vessels may come out, a neutral vessel coming out of the blockaded port must be allowed to pass free.

ARTICLE 17.—Neutral vessels may not be captured for breach of blockade except within the area of operations of the warships detailed to render the blockade effective.

ARTICLE 18.—The blockading forces must not bar access to neutral ports or coasts.

ARTICLE 19.—Whatever may be the ulterior destination of a vessel or of her cargo, she cannot be captured for breach of blockade, if, at the moment, she is on her way to a non-blockaded port.

ARTICLE 20.—A vessel which has broken blockade outwards, or which has attempted to break blockade inwards, is liable to capture so long as she is pursued by a ship of the blockading force. If the pursuit is abandoned, or if the blockade is raised, her capture can no longer be effected.

ARTICLE 21.—A vessel found guilty of breach of blockade is liable to condemnation. The cargo is also condemned, unless it is proved that at the time of the shipment of the goods the shipper neither knew nor could have known of the intention to break the blockade.

CHAPTER II.—CONTRABAND OF WAR.

ARTICLE 22.—The following articles may, without notice, be treated as contraband of war, under the name of absolute contraband :—

(1) Arms of all kinds, including arms for sporting purposes, and their distinctive component parts.
(2) Projectiles, charges, and cartridges of all kinds, and their distinctive component parts.
(3) Powder and explosives specially prepared for use in war.
(4) Gun-mountings, limber boxes, limbers, military waggons, field forges, and their distinctive component parts.
(5) Clothing and equipment of a distinctively military character.
(6) All kinds of harness of a distinctively military character.
(7) Saddle, draught, and pack animals suitable for use in war.
(8) Articles of camp equipment, and their distinctive component parts.
(9) Armour-plates.
(10) Warships, including boats, and their distinctive component parts of such a nature that they can only be used on a vessel of war.
(11) Implements and apparatus designed exclusively for the manufacture of munitions of war, for the manufacture or repair of arms, or war material for use on land or sea.

ARTICLE 23.—Articles exclusively used for war may be added to the list of absolute contraband by a declaration, which must be notified.

Such notification must be addressed to the Governments of other Powers, or

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to their representatives accredited to the Power making the declaration. A notification made after the outbreak of hostilities is addressed only to neutral Powers.

ARTICLE 24.—The following articles, susceptible of use in war as well as for purposes of peace, may, without notice, be treated as contraband of war, under the name of conditional contraband:—

(1) Foodstuffs.
(2) Forage and grain, suitable for feeding animals.
(3) Clothing, fabrics for clothing, and boots and shoes, suitable for use in war.
(4) Gold and silver in coin or bullion; paper money.
(5) Vehicles of all kinds available for use in war, and their component parts.
(6) Vessels, craft, and boats of all kinds; floating docks, parts of docks and their component parts.
(7) Railway material, both fixed and rolling-stock, and material for telegraphs, wireless telegraphs, and telephones.
(8) Balloons and flying machines and their distinctive component parts, together with accessories and articles recognisable as intended for use in connection with balloons and flying machines.
(9) Fuel; lubricants.
(10) Powder and explosives not specially prepared for use in war.
(11) Barbed wire and implements for fixing and cutting the same.
(12) Horseshoes and shoeing materials.
(13) Harness and saddlery.
(14) Field glasses, telescopes, chronometers, and all kinds of nautical instruments.

ARTICLE 25.—Articles susceptible of use in war as well as for purposes of peace, other than those enumerated in Articles 22 and 24, may be added to the list of conditional contraband by a declaration, which must be notified in the manner provided for in the second paragraph of Article 23.

ARTICLE 26.—If a Power waives, so far as it is concerned, the right to treat as contraband of war an article comprised in any of the classes enumerated in Articles 22 and 24, such intention shall be announced by a declaration, which must be notified in the manner provided for in the second paragraph of Article 23.

ARTICLE 27.—Articles which are not susceptible of use in war may not be declared contraband of war.

ARTICLE 28.—The following may not be declared contraband of war:—

(1) Raw cotton, wool, silk, jute, flax, hemp, and other raw materials of the textile industries, and yarns of the same.
(2) Oil seeds and nuts; copra.
(3) Rubber, resins, gums, and lacs; hops.
(4) Raw hides and horns, bones, and ivory.
(5) Natural and artificial manures, including nitrates and phosphates for agricultural purposes.
(6) Metallic ores.
(7) Earths, clays, lime, chalk, stone, including marble, bricks, slates, and tiles.
(8) Chinaware and glass.
(9) Paper and paper-making materials.
(10) Soap, paint and colours, including articles exclusively used in their manufacture, and varnish.
(11) Bleaching powder, soda ash, caustic soda, salt cake, ammonia, sulphate of ammonia, and sulphate of copper.
(12) Agricultural, mining, textile, and printing machinery.
(13) Precious and semi-precious stones, pearls, mother-of-pearl, and coral.
(14) Clocks and watches, other than chronometers.
(15) Fashion and fancy goods.
(16) Feathers of all kinds, hairs, and bristles.
(17) Articles of household furniture and decoration; office furniture and requisites.

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ARTICLE 29.—Likewise the following may not be treated as contraband of war:—

(1) Articles serving exclusively to aid the sick and wounded. They can, however, in case of urgent military necessity and subject to the payment of compensation, be requisitioned, if their destination is that specified in Article 30.

(2) Articles intended for the use of the vessel in which they are found, as well as those intended for the use of her crew and passengers during the voyage.

ARTICLE 30.—Absolute contraband is liable to capture if it is shown to be destined to territory belonging to or occupied by the enemy, or to the armed forces of the enemy. It is immaterial whether the carriage of the goods is direct or entails transhipment or a subsequent transport by land.

ARTICLE 31.—Proof of the destination specified in Article 30 is complete in the following cases:—

(1) When the goods are documented for discharge in an enemy port, or for delivery to the armed forces of the enemy.

(2) When the vessel is to call at enemy ports only, or when she is to touch at an enemy port or meet the armed forces of the enemy before reaching the neutral port for which the goods in question are documented.

ARTICLE 32.—Where a vessel is carrying absolute contraband, her papers are conclusive proof as to the voyage on which she is engaged, unless she is found clearly out of the course indicated by her papers, and unable to give adequate reasons to justify such deviation.

ARTICLE 33.—Conditional contraband is liable to capture if it is shown to be destined for the use of the armed forces or of a government department of the enemy State, unless in this latter case the circumstances show that the goods cannot in fact be used for the purposes of the war in progress. This latter exception does not apply to a consignment coming under Article 24 (4).

ARTICLE 34.—The destination referred to in Article 33 is presumed to exist if the goods are consigned to enemy authorities, or to a contractor established in the enemy country who, as a matter of common knowledge, supplies articles of this kind to the enemy. A similar presumption arises if the goods are consigned to a fortified place belonging to the enemy, or other place serving as a base for the armed forces of the enemy. No such presumption, however, arises in the case of a merchant vessel bound for one of these places if it is sought to prove that she herself is contraband.

In cases where the above presumptions do not arise, the destination is presumed to be innocent.

The presumptions set up by this Article may be rebutted.

ARTICLE 35.—Conditional contraband is not liable to capture, except when found on board a vessel bound for territory belonging to or occupied by the enemy, or for the armed forces of the enemy, and when it is not be discharged in an intervening neutral port.

The ship's papers are conclusive proof both as to the voyage on which the vessel is engaged and as to the port of discharge of the goods, unless she is found clearly out of the course indicated by her papers, and unable to give adequate reasons to justify such deviation.

ARTICLE 36.—Notwithstanding the provisions of Article 35, conditional contraband, if shown to have the destination referred to in Article 33, is liable to capture in cases where the enemy country has no seaboard.

ARTICLE 37.—A vessel carrying goods liable to capture as absolute or conditional contraband may be captured on the high seas or in the territorial waters of the belligerents throughout the whole of her voyage, even if she is to touch at a port of call before reaching the hostile destination.

ARTICLE 38.—A vessel may not be captured on the ground that she has carried contraband on a previous occasion if such carriage is in point of fact at an end.

ARTICLE 39.—Contraband goods are liable to condemnation.

ARTICLE 40.—A vessel carrying contraband may be condemned if the contra-

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band, reckoned either by value, weight, volume, or freight, forms more than half the cargo.

ARTICLE 41.—If a vessel carrying contraband is released, she may be condemned to pay the costs and expenses incurred by the captor in respect of the proceedings in the national prize court and the custody of the ship and cargo during the proceedings.

ARTICLE 42.—Goods which belong to the owner of the contraband and are on board the same vessel are liable to condemnation.

ARTICLE 43.—If a vessel is encountered at sea while unaware of the outbreak of hostilities or of the declaration of contraband which applies to her cargo, the contraband cannot be condemned except on payment of compensation; the vessel herself and the remainder of the cargo are not liable to condemnation or to the costs and expenses referred to in Article 41. The same rule applies if the master, after becoming aware of the outbreak of hostilities, or of the declaration of contraband, has had no opportunity of discharging the contraband.

A vessel is deemed to be aware of the existence of a state of war, or of a declaration of contraband, if she left a neutral port subsequently to the notification to the Power to which such port belongs of the outbreak of hostilities or of the declaration of contraband respectively, provided that such notification was made in sufficient time. A vessel is also deemed to be aware of the existence of a state of war if she left an enemy port after the outbreak of hostilities.

ARTICLE 44.—A vessel which has been stopped on the ground that she is carrying contraband, and which is not liable to condemnation on account of the proportion of contraband on board, may, when the circumstances permit, be allowed to continue her voyage if the master is willing to hand over the contraband to the belligerent warship.

The delivery of the contraband must be entered by the captor on the logbook of the vessel stopped, and the master must give the captor duly certified copies of all relevant papers.

The captor is at liberty to destroy the contraband that has been handed over to him under these conditions.

CHAPTER III.—UNNEUTRAL SERVICE.

ARTICLE 45.—A neutral vessel will be condemned and will, in a general way, receive the same treatment as a neutral vessel liable to condemnation for carriage of contraband:—

(1) If she is on a voyage specially undertaken with a view to the transport of individual passengers who are embodied in the armed forces of the enemy, or with a view to the transmission of intelligence in the interest of the enemy.

(2) If, to the knowledge of either the owner, the charterer, or the master, she is transporting a military detachment of the enemy, or one or more persons who, in the course of the voyage, directly assist the operations of the enemy.

In the cases specified under the above heads, goods belonging to the owner of the vessel are likewise liable to condemnation.

The provisions of the present article do not apply if the vessel is encountered at sea while unaware of the outbreak of hostilities, or if the master, after becoming aware of the outbreak of hostilities, has had no opportunity of disembarking the passengers. The vessel is deemed to be aware of the existence of a state of war if she left an enemy port subsequently to the outbreak of hostilities, or a neutral port subsequently to the notification of the outbreak of hostilities to the Power to which such port belongs, provided that such notification was made in sufficient time.

ARTICLE 46.—A neutral vessel will be condemned and, in a general way, receive the same treatment as would be applicable to her if she were an enemy merchant vessel:—

(1) If she takes a direct part in the hostilities;

(2) If she is under the orders or control of an agent placed on board by the enemy Government;

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(3) If she is in the exclusive employment of the enemy Government;
(4) If she is exclusively engaged at the time either in the transport of enemy troops or in the transmission of intelligence in the interest of the enemy.

In the cases covered by the present Article, goods belonging to the owner of the vessel are likewise liable to condemnation.

ARTICLE 47.—Any individual embodied in the armed forces of the enemy who is found on board a neutral merchant vessel may be made a prisoner of war, even though there be no ground for the capture of the vessel.

CHAPTER IV.—DESTRUCTION OF NEUTRAL PRIZES.

ARTICLE 48.—A neutral vessel which has been captured may not be destroyed by the captor; she must be taken into such port as is proper for the determination there of all questions concerning the validity of the capture.

ARTICLE 49.—As an exception, a neutral vessel which has been captured by a belligerent warship, and which would be liable to condemnation, may be destroyed if the observance of Article 48 would involve danger to the safety of the warship or to the success of the operations in which she is engaged at the time.

ARTICLE 50.—Before the vessel is destroyed all persons on board must be placed in safety, and all the ship's papers and other documents which the parties interested consider relevant for the purpose of deciding on the validity of the capture must be taken on board the warship.

ARTICLE 51.—A captor who has destroyed a neutral vessel must, prior to any decision respecting the validity of the prize, establish that he only acted in the face of an exceptional necessity of the nature contemplated in Article 49. If he fails to do this, he must compensate the parties interested and no examination shall be made of the question whether the capture was valid or not.

ARTICLE 52.—If the capture of a neutral vessel is subsequently held to be invalid, though the act of destruction has been held to have been justifiable, the captor must pay compensation to the parties interested, in place of the restitution to which they would have been entitled.

ARTICLE 53.—If neutral goods not liable to condemnation have been destroyed with the vessel, the owner of such goods is entitled to compensation.

ARTICLE 54.—The captor has the right to demand the handing over, or to proceed himself to the destruction of, any goods liable to condemnation found on board a vessel not herself liable to condemnation, provided that the circumstances are such as would, under Article 49, justify the destruction of a vessel herself liable to condemnation. The captor must enter the goods surrendered or destroyed in the logbook of the vessel stopped, and must obtain duly certified copies of all relevant papers. When the goods have been handed over or destroyed, and the formalities duly carried out, the master must be allowed to continue his voyage.

The provisions of Articles 51 and 52 respecting the obligations of a captor who has destroyed a neutral vessel are applicable.

CHAPTER V.—TRANSFER TO A NEUTRAL FLAG.

ARTICLE 55.—The transfer of an enemy vessel to a neutral flag, effected before the outbreak of hostilities, is valid, unless it is proved that such transfer was made in order to evade the consequences to which an enemy vessel, as such, is exposed. There is, however, a presumption, if the bill of sale is not on board a vessel which has lost her belligerent nationality less than sixty days before the outbreak of hostilities, that the transfer is void. This presumption may be rebutted.

Where the transfer was effected more than thirty days before the outbreak of hostilities, there is an absolute presumption that it is valid if it is unconditional, complete, and in conformity with the laws of the countries concerned, and if its effect is such that neither the control of, nor the profits arising from the employment of, the vessel remain in the same hands as before the transfer. If, however, the vessel has lost her belligerent nationality less than sixty days

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before the outbreak of hostilities and if the bill of sale is not on board, the capture of the vessel gives no right to damages.

ARTICLE 56.—The transfer of an enemy vessel to a neutral flag, effected after the outbreak of hostilities, is void unless it is proved that such transfer was not made in order to evade the consequences to which an enemy vessel, as such, is exposed.

There, however, is an absolute presumption that a transfer is void—

(1) If the transfer has been made during a voyage or in a blockaded port.
(2) If a right to repurchase or recover the vessel is reserved to the vendor.
(3) If the requirements of the municipal law governing the right to fly the flag under which the vessel is sailing have not been fulfilled.

CHAPTER VI.—ENEMY CHARACTER.

ARTICLE 57.—Subject to the provisions respecting transfer to another flag, the neutral or enemy character of a vessel is determined by the flag which she is entitled to fly.

The case where a neutral vessel is engaged in a trade which is closed in time of peace remains outside the scope of, and is in no wise affected by, this rule.

ARTICLE 58.—The neutral or enemy character of goods found on board an enemy vessel is determined by the neutral or enemy character of the owner.

ARTICLE 59.—In the absence of proof of the neutral character of goods found on board an enemy vessel, they are presumed to be enemy goods.

ARTICLE 60.—Enemy goods on board an enemy vessel retain their enemy character until they reach their destination, notwithstanding any transfer effected after the outbreak of hostilities while the goods are being forwarded.

If, however, prior to the capture, a former neutral owner exercises, on the bankruptcy of an existing enemy owner, a recognised legal right to recover the goods, they regain their neutral character.

CHAPTER VII.—CONVOY.

ARTICLE 61.—Neutral vessels under national convoy are exempt from search. The commander of a convoy gives, in writing, at the request of the commander of a belligerent warship, all information as to the character of the vessels and their cargoes, which could be obtained by search.

ARTICLE 62.—If the commander of the belligerent warship has reason to suspect that the confidence of the commander of the convoy has been abused, he communicates his suspicions to him. In such a case it is for the commander of the convoy alone to investigate the matter. He must record the result of such investigation in a report, of which a copy is handed to the officer of the warship. If, in the opinion of the commander of the convoy, the facts shown in the report justify the capture of one or more vessels, the protection of the convoy must be withdrawn from such vessels.

CHAPTER VIII.—RESISTANCE TO SEARCH.

ARTICLE 63.—Forcible resistance to the legitimate exercise of the right of stoppage, search, and capture, involves in all cases the condemnation of the vessel. The cargo is liable to the same treatment as the cargo of an enemy vessel. Goods belonging to the master or owner of the vessel are treated as enemy goods.

CHAPTER IX.—COMPENSATION.

ARTICLE 64.—If the capture of a vessel or of goods is not upheld by the prize court, or if the prize is released without any judgment being given, the parties interested have the right to compensation, unless there were good reasons for capturing the vessel or goods.

FINAL PROVISIONS.

ARTICLE 65.—The provisions of the present Declaration must be treated as a whole, and cannot be separated.

ARTICLE 66.—The Signatory Powers undertake to insure the mutual observance of the rules contained in the present Declaration in any war in which all

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the belligerents are parties thereto. They will therefore issue the necessary instructions to their authorities and to their armed forces, and will take such measures as may be required in order to insure that it will be applied by their courts, and more particularly by their prize courts.

ARTICLE 67.—The present Declaration shall be ratified as soon as possible.

The ratifications shall be deposited in London.

The first deposit of ratifications shall be recorded in a Protocol signed by the Representatives of the Powers taking part therein, and by His Britannic Majesty's Principal Secretary of State for Foreign Affairs.

The subsequent deposits of ratifications shall be made by means of a written notification addressed to the British Government, and accompanied by the instrument of ratification.

A duly certified copy of the Protocol relating to the first deposit of ratifications and of the notifications mentioned in the preceding paragraph as well as of the instruments of ratification which accompany them, shall be immediately sent by the British Government, through the diplomatic channel, to the Signatory Powers. The said Government shall, in the cases contemplated in the preceding paragraph, inform them at the same time of the date on which it received the notification.

ARTICLE 68.—The present Declaration shall take effect, in the case of the Powers which were parties to the first deposit of ratifications, sixty days after the date of the Protocol recording such deposit, and, in the case of the Powers which shall ratify subsequently, sixty days after the notification of their ratification shall have been received by the British Government.

ARTICLE 69.—In the event of one of the Signatory Powers wishing to denounce the present Declaration, such denunciation can only be made to take effect at the end of a period of twelve years beginning sixty days after the first deposit of ratifications, and, after that time, at the end of successive periods of six years, of which the first will begin at the end of the period of twelve years.

Such denunciation must be notified in writing, at least one year in advance, to the British Government, which shall inform all the other Powers.

It will only operate in respect of the denouncing Power.

ARTICLE 70.—The Powers represented at the London Naval Conference attach particular importance to the general recognition of the rules which they have adopted, and therefore express the hope that the Powers which were not represented there will accede to the present Declaration. They request the British Government to invite them to do so.

A Power which desires to accede shall notify its intention in writing to the British Government, and transmit simultaneously the act of accession, which will be deposited in the archives of the said Government.

The said Government shall forthwith transmit to all the other Powers a duly certified copy of the notification, together with the act of accession, and communicate the date on which such notification was received. The accession takes effect sixty days after such date.

In respect of all matters concerning this Declaration, acceding Powers shall be on the same footing as the Signatory Powers.

ARTICLE 71.—The present Declaration, which bears the date of the 26th February, 1909, may be signed in London up till the 30th June, 1909, by the Plenipotentiaries of the Powers represented at the Naval Conference.

In faith whereof the Plenipotentiaries have signed the present Declaration, and have thereto affixed their seals.

Done at London, the 26th day of February, one thousand nine hundred and nine, in a single original, which shall remain deposited in the archives of the British Government, and of which duly certified copies shall be sent through the diplomatic channel to the Powers represented at the Naval Conference.

List of signatures appended to the Declaration of February 26, 1909, *up to March* 20, 1909:—

For Germany: KRIEGE.
For the United States of America: C. H. STOCKTON, GEORGE GRAFTON WILSON.
For Austria-Hungary: C. DUMBA.
For France: L. RENAULT.
For Great Britain: DESART.
For the Netherlands: J. A. ROËLL, L. H. RUYSSENAERS.

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